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Apéndice A

Resultados en elementos triangulares

Coarse Model

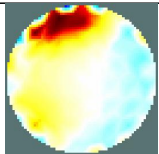
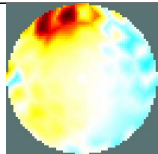
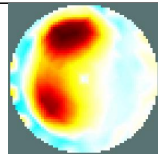
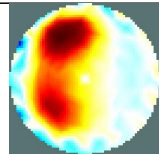
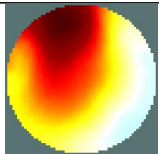
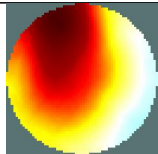
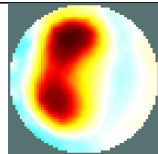
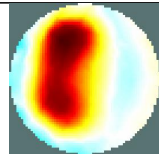
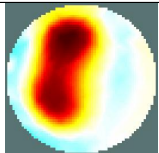
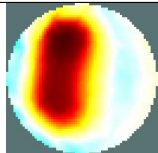
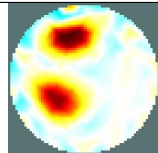
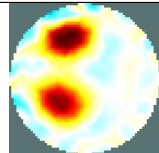
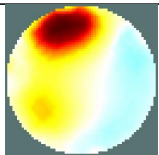
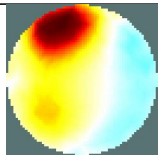
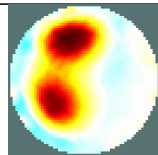
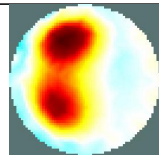
COARSE MODEL	Hiperparámetro=0.1		Hiperpaámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				

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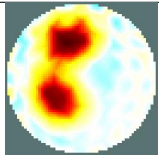
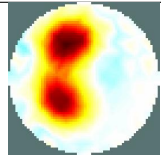
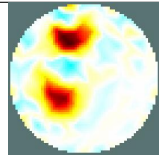
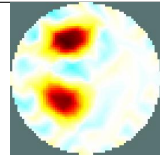
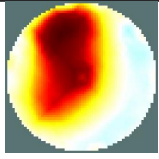
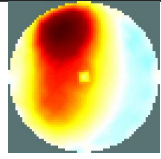
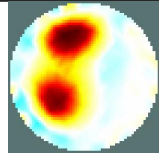
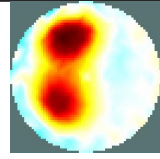
Noser				
Gaussian HPF				

Tabla A.1: Resultados de imágenes en **Coarse Model**.

Conjugate Gradient

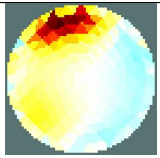
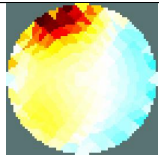
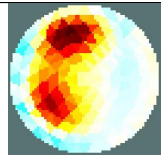
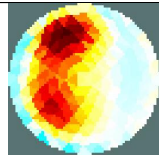
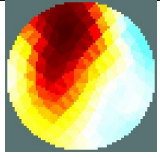
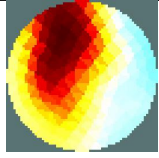
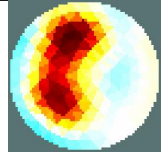
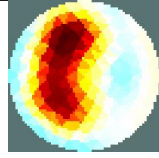
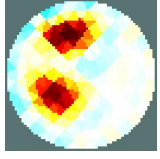
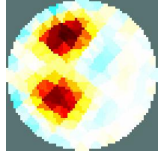
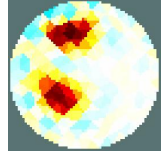
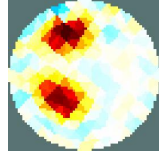
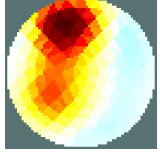
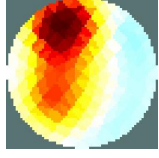
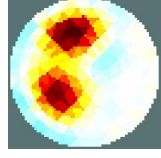
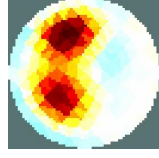
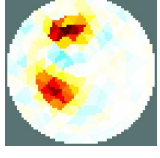
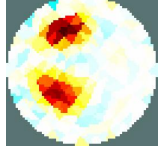
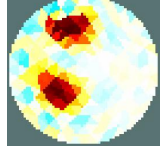
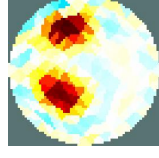
CONJUGATE GRADIENT	Hiperparámetro=0.1		Hiperparámetro=0.01	
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Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				

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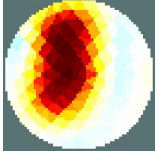
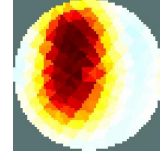
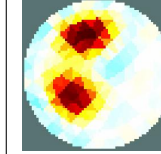
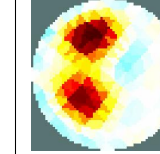
Gaussian HPF				
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Tabla A.2: Resultados de imágenes en **Conjugate Gradient**.

Gauss newton a un paso

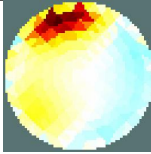
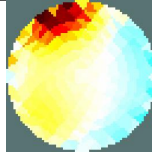
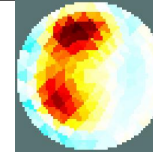
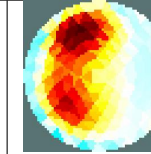
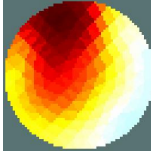
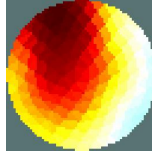
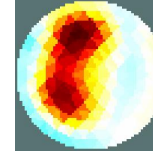
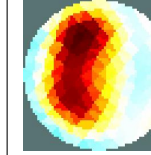
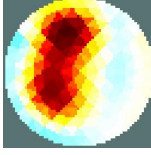
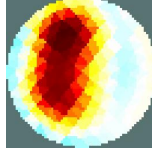
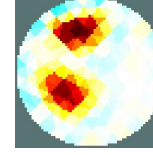
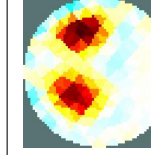
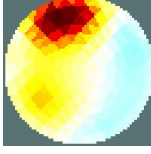
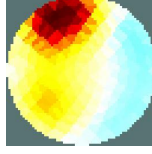
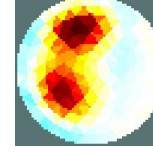
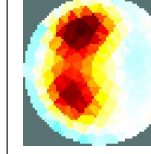
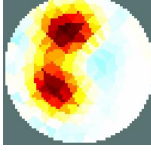
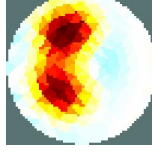
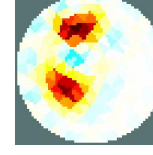
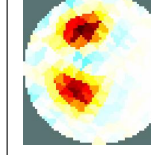
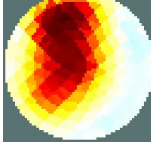
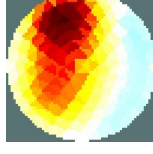
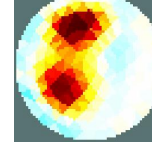
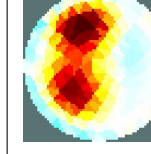
Gauss Newton One-Step	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla A.3 continua en la siguiente página

Tabla A.3: Resultados de imágenes en **Gauss Newton One sttep**.

Gauss Newton Prior

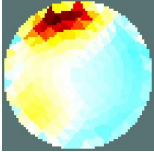
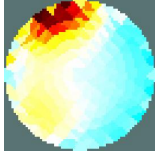
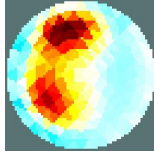
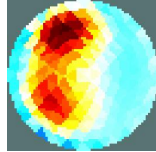
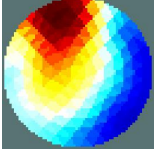
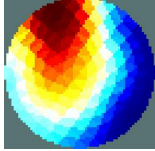
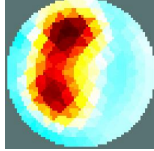
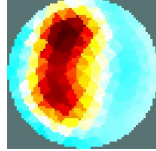
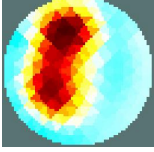
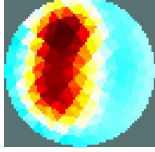
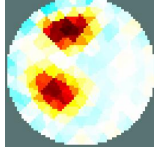
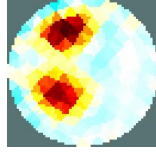
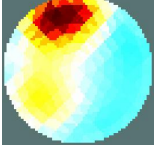
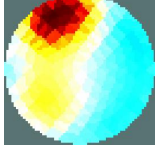
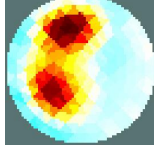
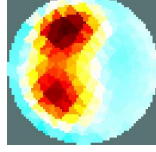
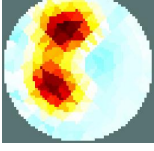
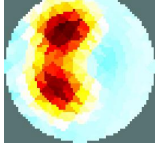
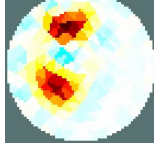
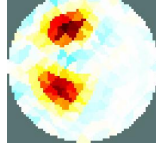
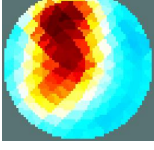
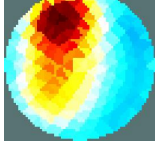
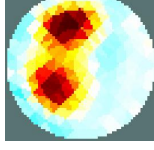
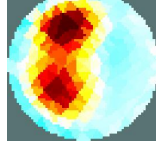
Gauss Newton Prior	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla A.4: Resultados de imágenes en **Gauss Newton Prior**.

PDIPM Absolute

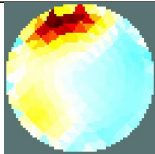
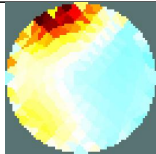
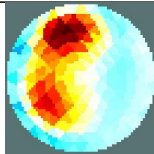
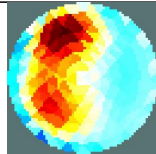
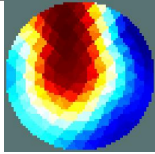
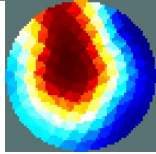
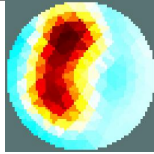
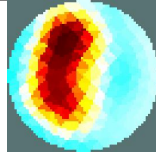
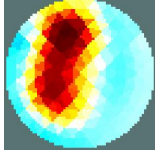
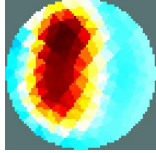
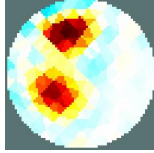
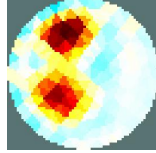
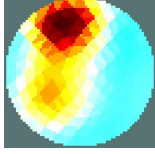
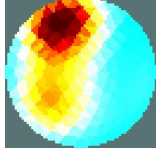
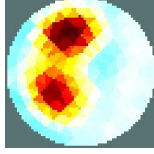
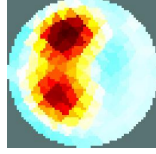
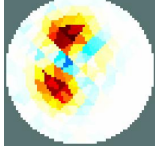
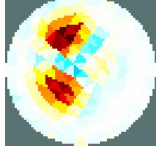
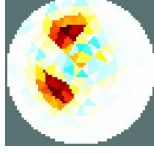
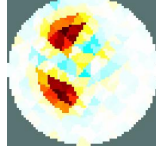
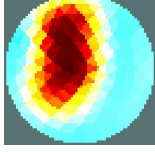
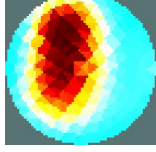
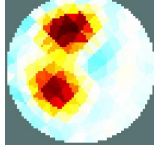
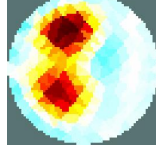
pdipm Absolute	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla A.5: Resultados de imágenes en PDIPM Absolute.

PDIPM difference

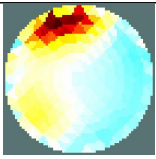
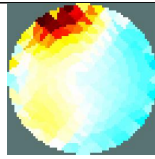
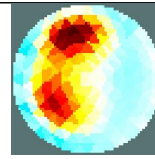
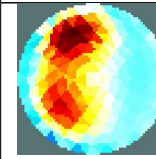
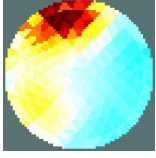
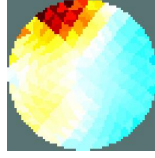

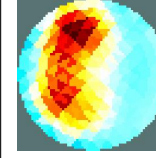
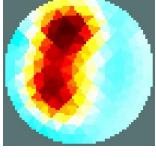
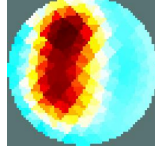
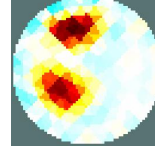
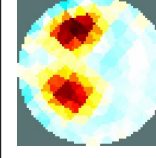
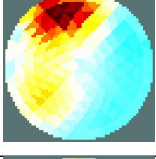
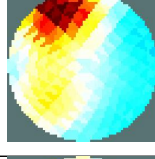
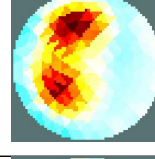
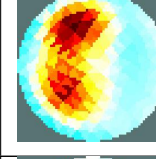
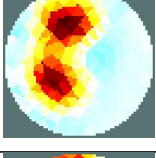
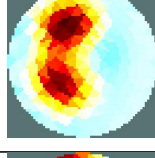
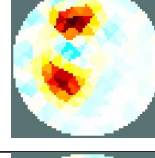
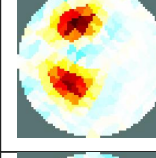
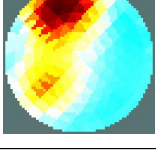
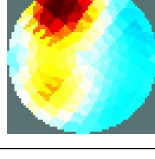
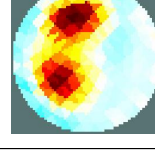
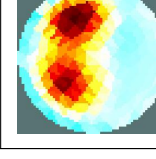
PDIPM difference	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla A.6: Resultados de imágenes en PDIPM Difference.

TV PDIPM

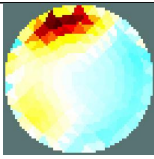
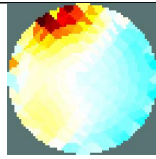
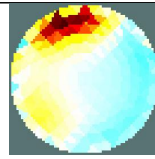
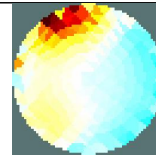
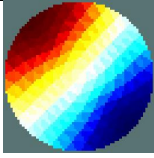
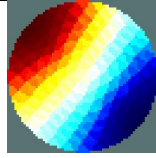
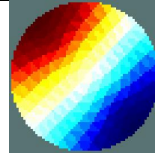
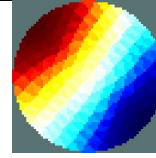
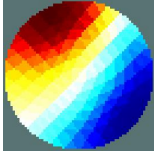
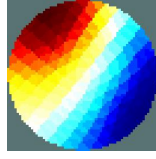
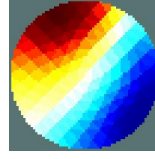
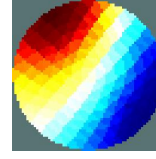
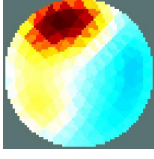
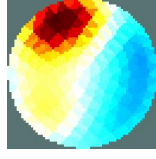
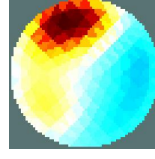
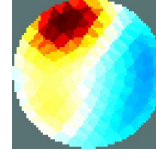
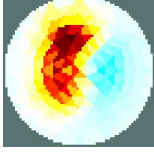
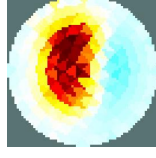
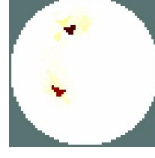
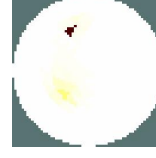
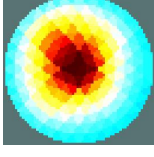
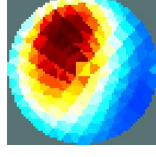
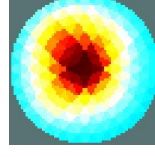
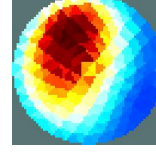
TV PDIPM	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla A.7: Resultados de imágenes en TV PDIPM.

TV irls

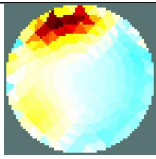
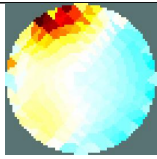
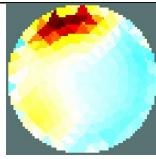
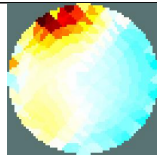
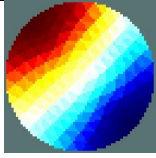
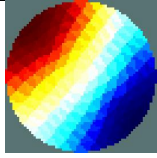
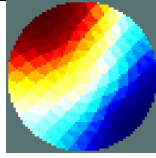
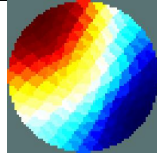
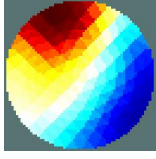
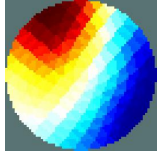
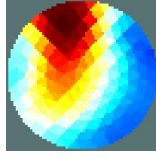
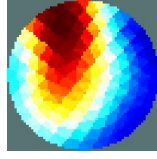
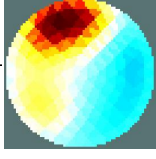
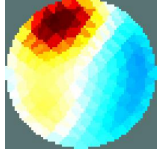
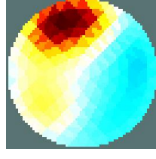
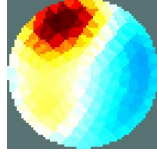
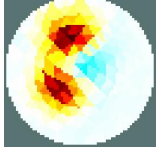

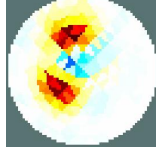
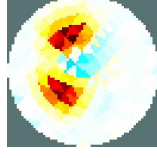
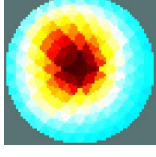
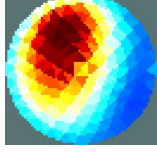
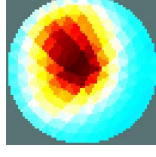
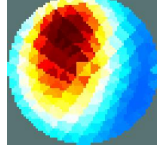
TV IRLS	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla A.8: Resultados de imágenes en **TV irls**.

TSVD

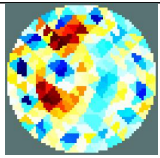
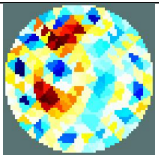
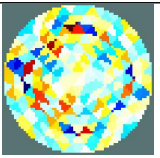
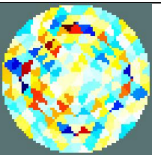
TSVD	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
-				

Tabla A.9: Resultados de imágenes en TSVD.

Kalman Solver

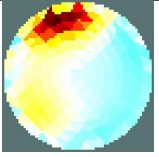
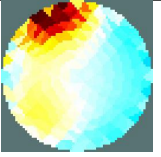
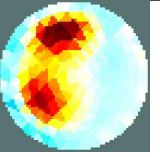
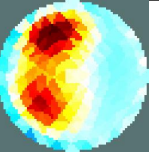
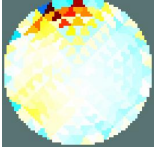
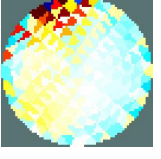
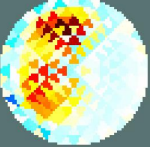
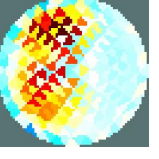
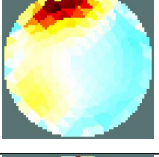
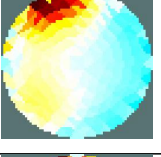
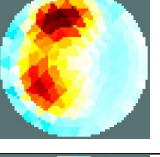
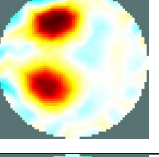
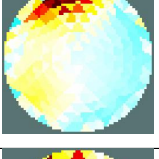
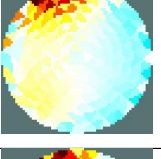
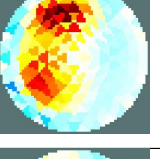
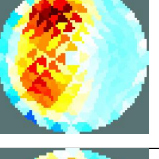
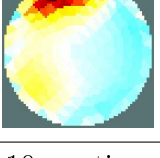
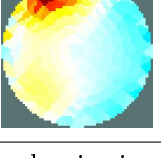
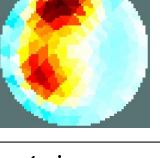
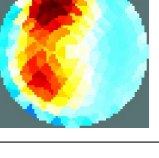
KALMAN SOLVER	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				

Tabla A.10 continua en la siguiente página.


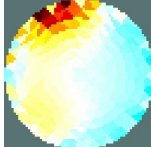
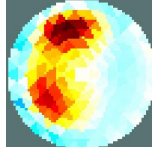
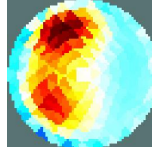
<p>Gaussian HPF</p>				
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Tabla A.10: Resultados de imágenes en **Kalman Solver**.

Back Projection

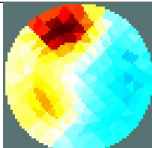
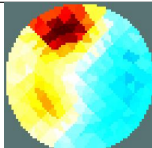
BACK PROJECTION	hiperprametro = 0.1	hiperprametro = 0.01
	FEM	
-		

Tabla A.11: Resultados de imágenes en **Back Projection**.

Apéndice B

Resultados con simulación de un elemento circular

Coarse Model

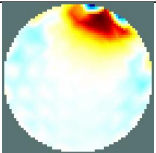
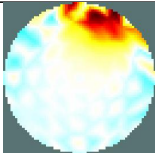
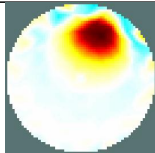
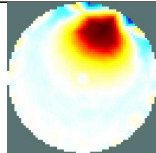
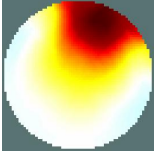
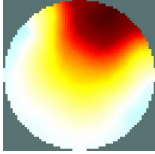
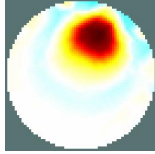
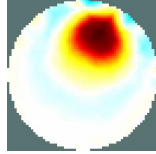
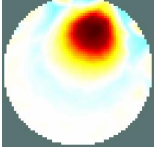
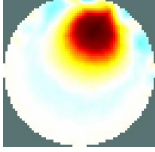
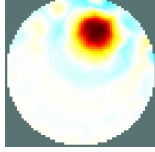
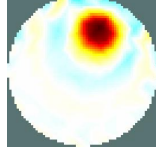
COARSE MODEL	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				

Tabla B.1 continua en la siguiente página.

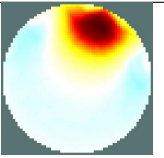
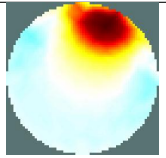
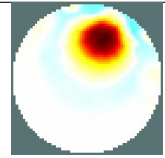
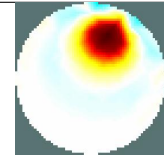
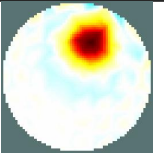
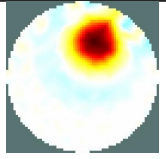
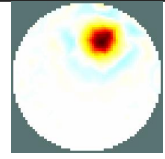
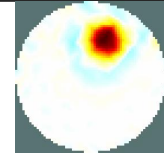
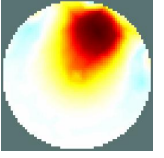
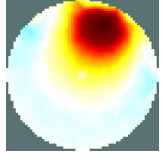
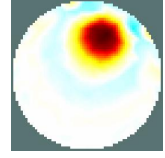
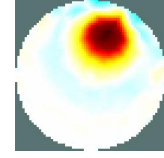
Exponential Covar				
Noser				
Gaussian HPF				

Tabla B.1: Resultados de imágenes en **Coarse Model**.

Conjugate Gradient

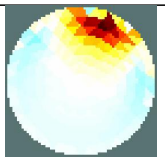
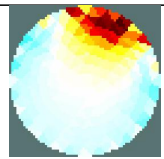
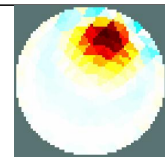
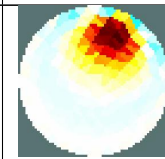
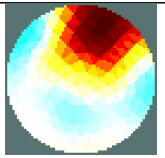
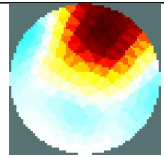
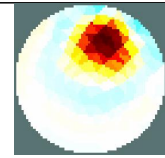
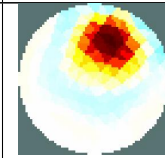
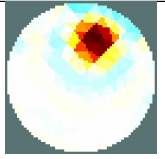
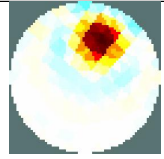
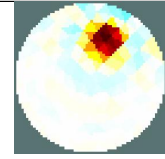
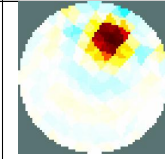
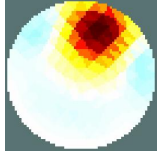
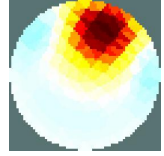
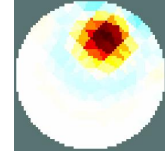
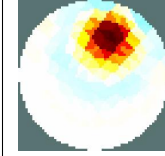
CONJUGATE GRADIENT	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				

Tabla B.2 continua en la siguiente página.

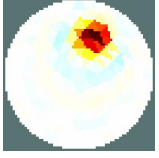
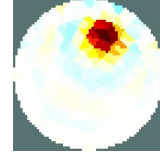
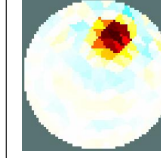
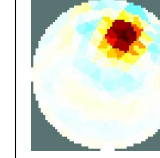
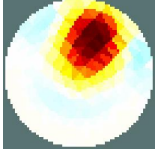
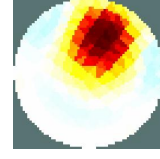
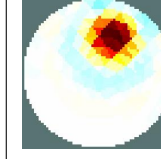
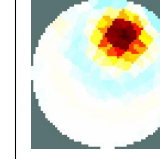
Noser				
Gaussian HPF				

Tabla B.2: Resultados de imágenes en **Conjugate Gradient**.

Gauss newton a un paso

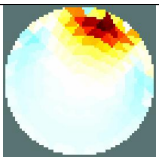
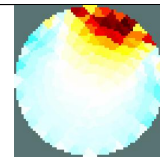
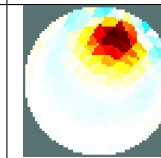
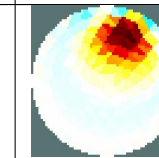
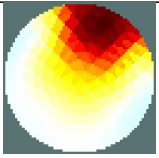
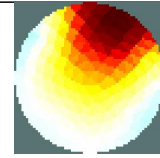
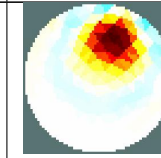
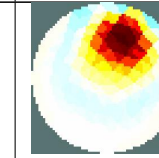
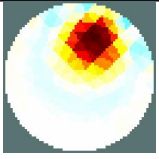
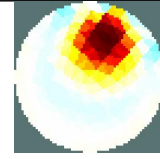
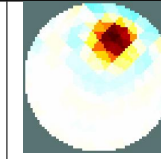
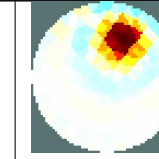
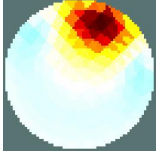
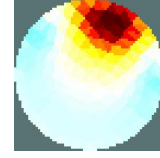
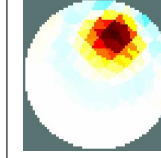
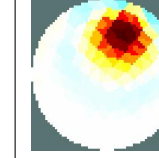
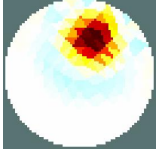
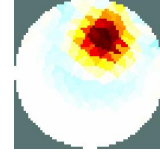
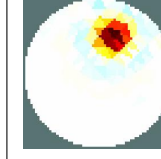
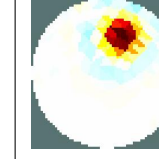
Gauss Newton One-Step	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				

Tabla B.3 continua en la siguiente página.

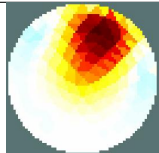
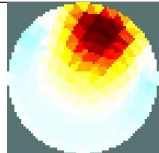
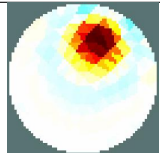
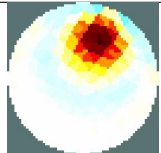
Gaussian HPF				
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Tabla B.3: Resultados de imágenes en **Gauss Newton One sttep**.

Gauss Newton Prior

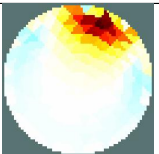
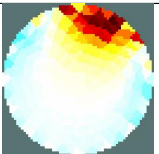
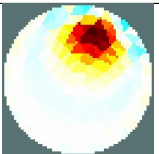
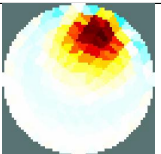
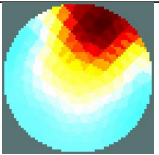
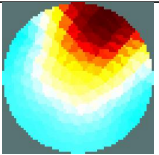
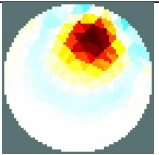
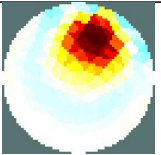
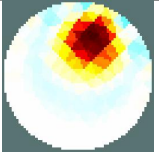
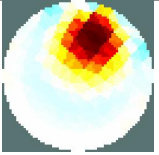
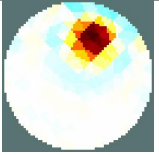
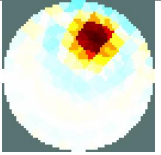
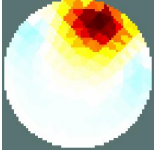
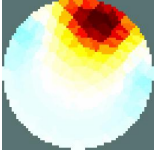
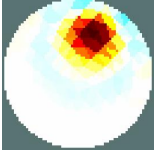
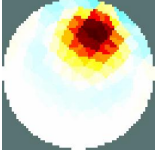
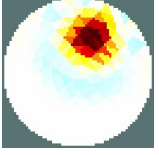
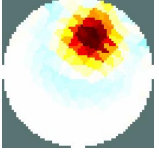
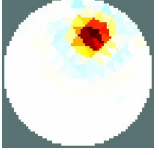
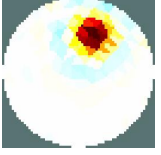
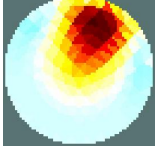
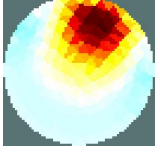
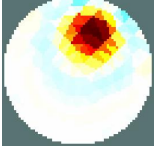
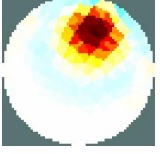
Gauss Newton Prior	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla B.4 continua en la siguiente página.

Tabla B.4: Resultados de imágenes en **Gauss Newton Prior**.

PDIPM Absolute

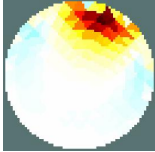
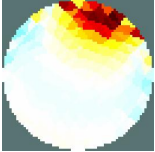
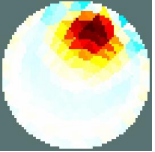
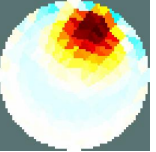
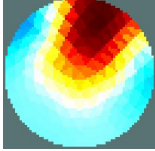
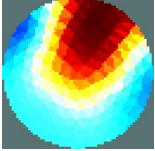
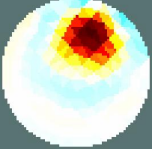
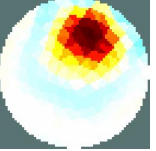
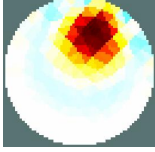
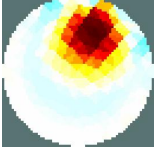
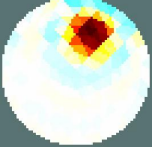
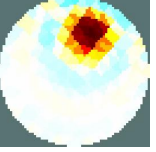
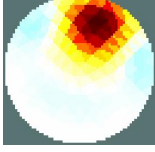
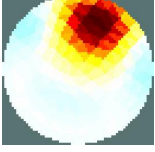
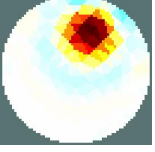
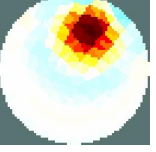
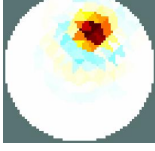
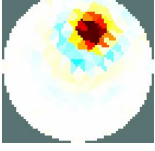

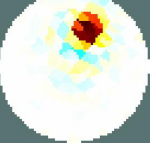
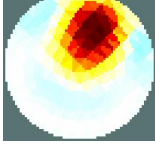
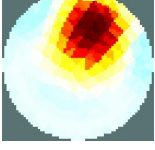
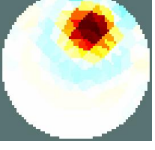
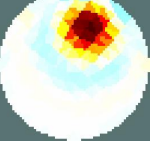
PDIPM Absolute	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla B.5: Resultados de imágenes en **PDIPM Absolute**.

PDIPM difference

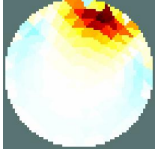
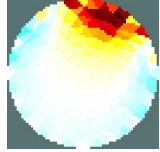
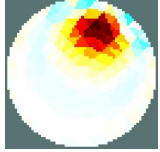
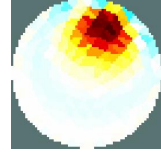
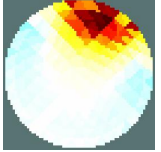
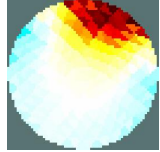
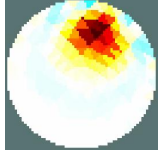
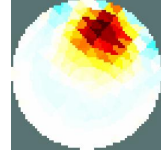
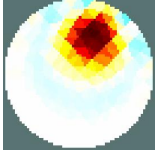
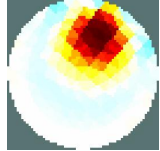
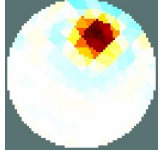
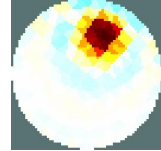
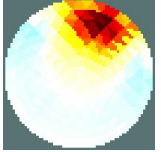
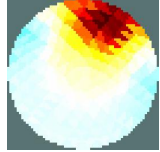
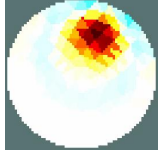
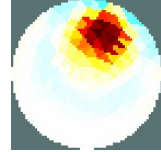
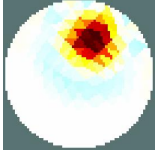
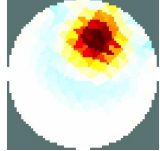
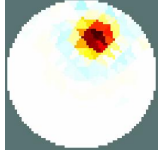
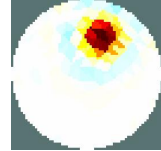
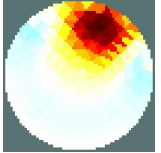
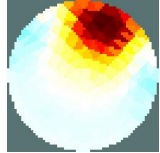
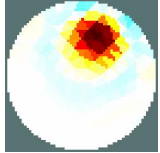
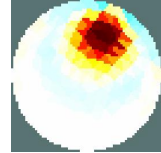
PDIPM difference	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla B.6: Resultados de imágenes en PDIPM Difference.

TV PDIPM

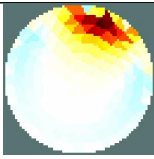
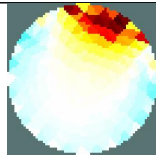
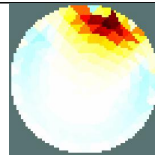
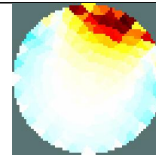
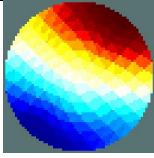
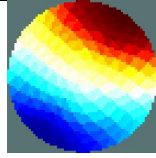
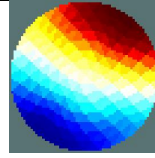
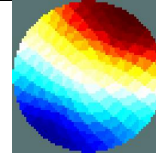
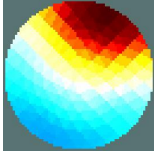
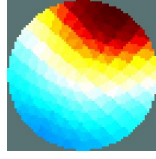
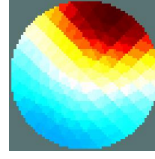
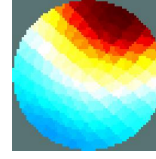
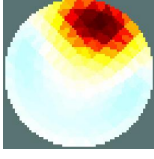
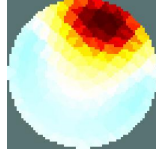
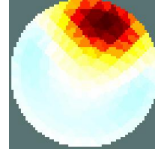
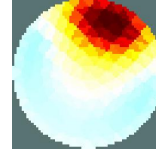
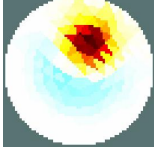

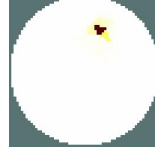
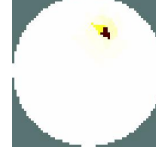
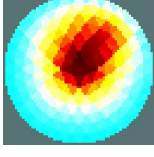
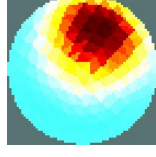
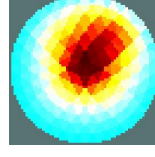
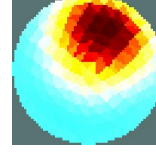
TV PDIPM	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla B.7: Resultados de imágenes en TV PDIPM.

TV IRLS

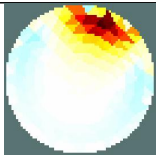
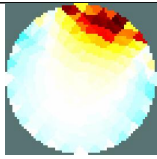
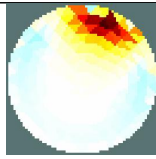
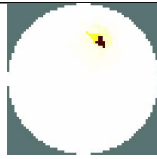
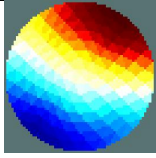
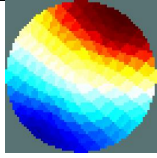
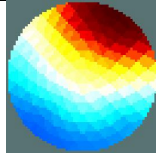
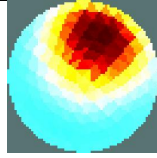
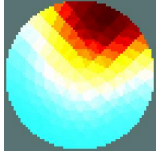
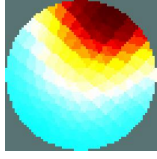
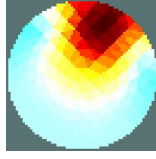
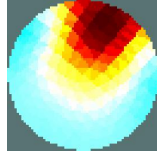
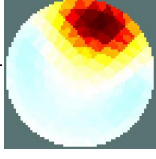
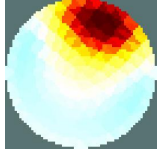
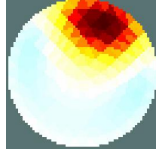
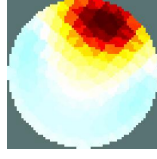

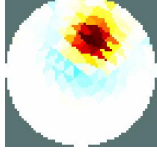
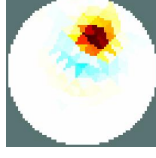
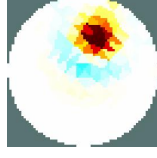
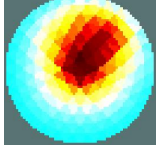
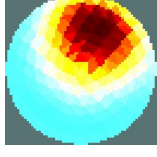
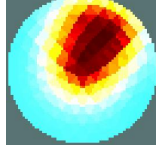
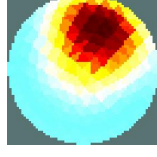
TV IRLS	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla B.8: Resultados de imágenes en **TV IRLS**.

TSVD

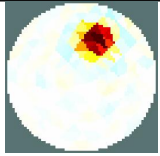
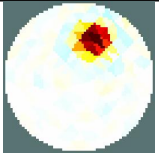
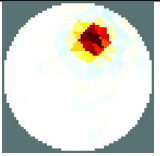
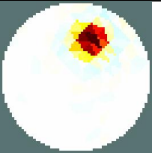
TSVD	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
-				

Tabla B.9: Resultados de imágenes en TSVD.

Kalman Solver

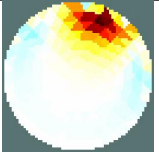
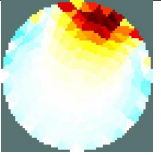
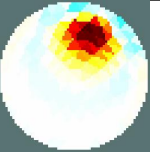
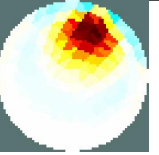
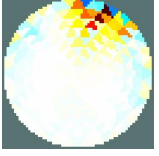

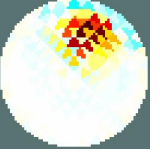
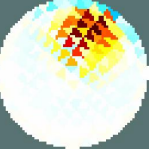
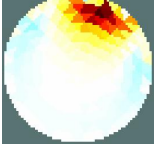

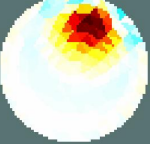
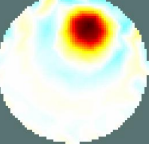
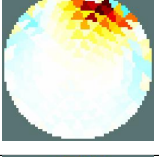
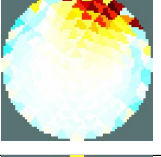
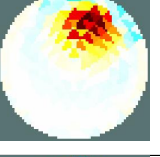
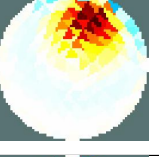
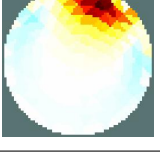
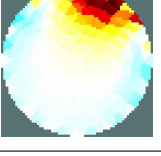
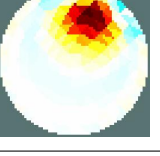
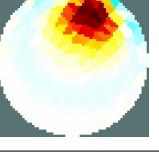
KALMAN SOLVER	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				
Laplace				
TV				
Exponential Covar				
Noser				

Tabla B.10 continua en la siguiente página.

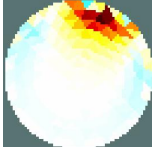
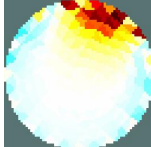
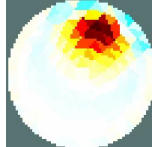
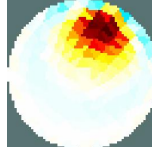
<p>Gaussian HPF</p>				
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Tabla B.10: Resultados de imágenes en **Kalman Solver**.

Back Projection

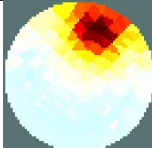
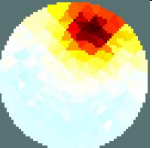
BACK PROJECTION	hiperparámetro = 0.1	hiperparámetro = 0.01
	FEM	
-		

Tabla B.11: Resultados de imágenes en **Back Projection**.

Apéndice C

Resultados de 3 modelos circulares, usando Netgen

Coarse Model

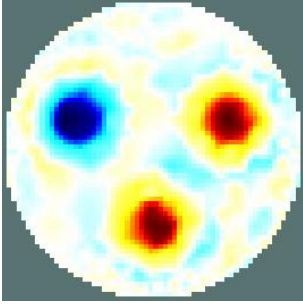
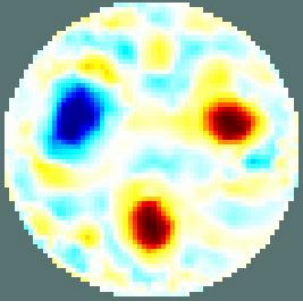
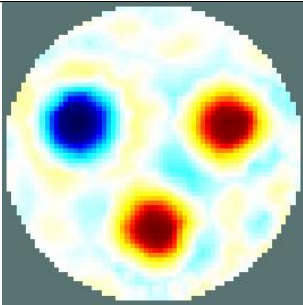
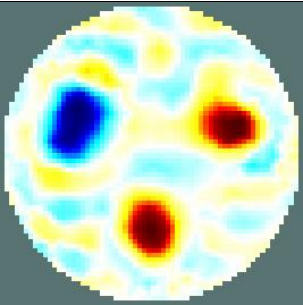
COARSE MODEL	Hiperparámetro=0.1	Hiperparámetro=0.01
Thikinov		
Laplace		

Tabla C.1 continua en la siguiente página.

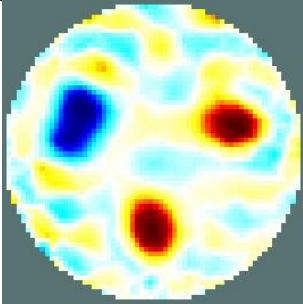
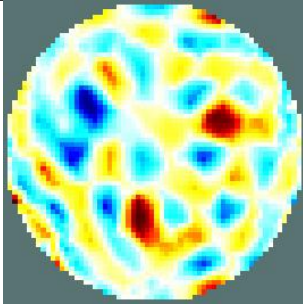
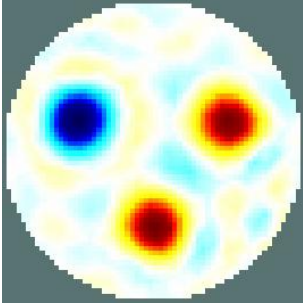
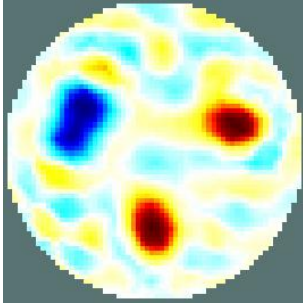
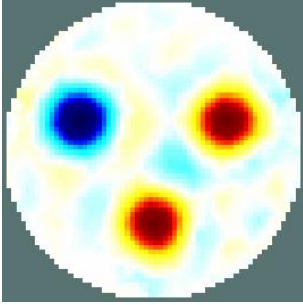
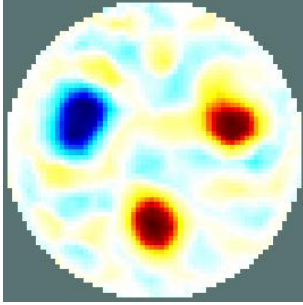
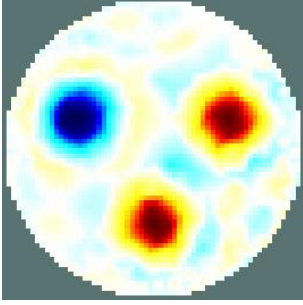
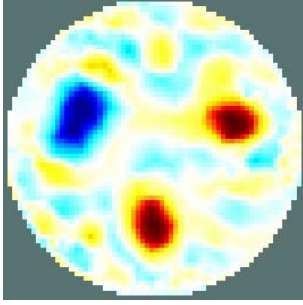
TV		
ExponentialCovar		
Noser		
GaussianHPF		

Tabla C.1: Resultados de imágenes en **Coarse Model**.

Conjugate Gradient

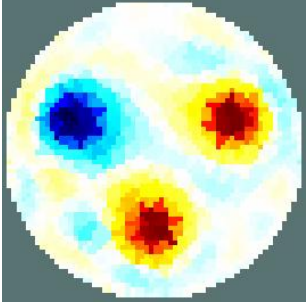
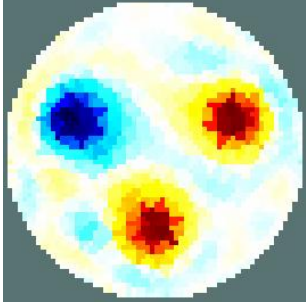
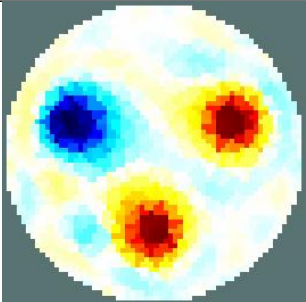
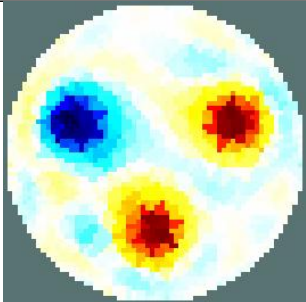
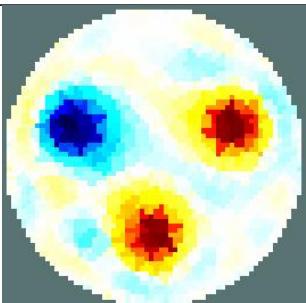
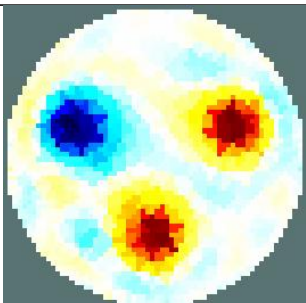
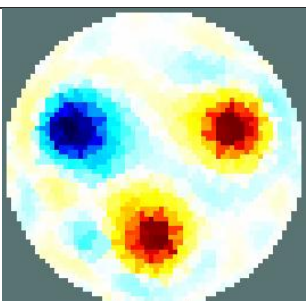
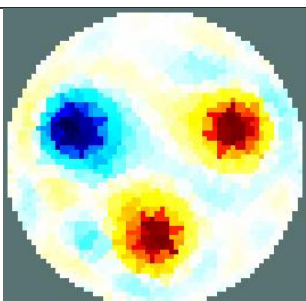
Conjugate Gradient	Hiperparámetro=0.1	Hiperparámetro=0.01
Thikinov		
Laplace		
TV		
ExponentialCovar		

Tabla C.2 continua en la siguiente página.

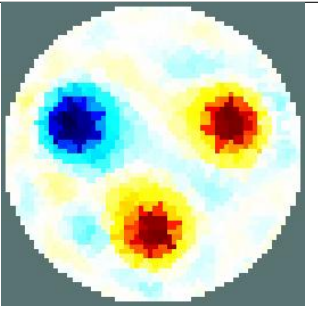
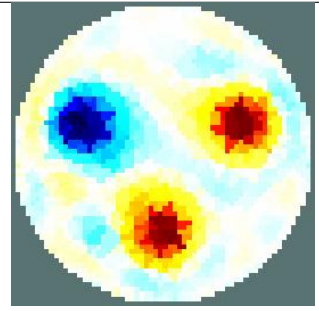
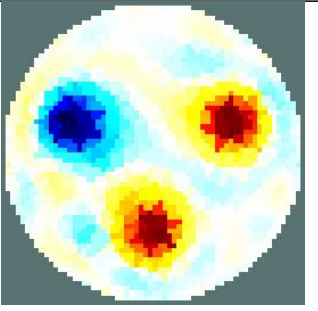
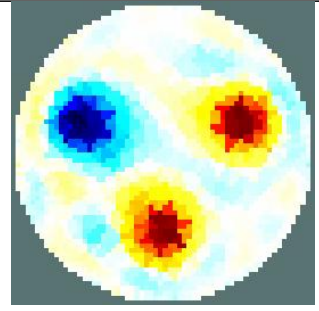
Noser		
GaussianHPF		

Tabla C.2: Resultados de imágenes en **Conjugate Gradient**.

Gauss Newton One step

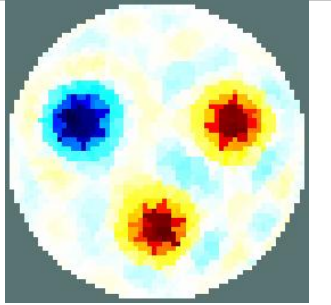
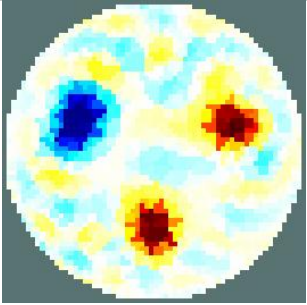
Gauss Newton One step	Hiperparámetro=0.1	Hiperparámetro=0.01
Thikinov		

Tabla C.3 continua en la siguiente página

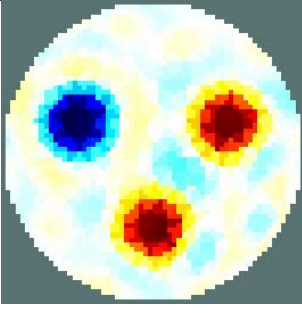
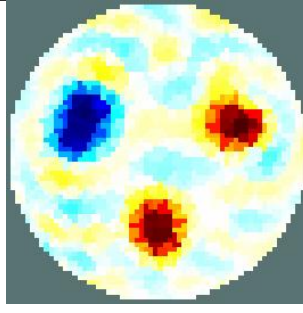
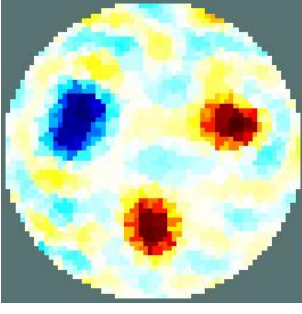
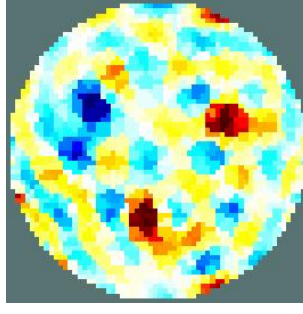
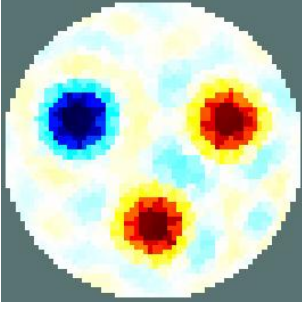
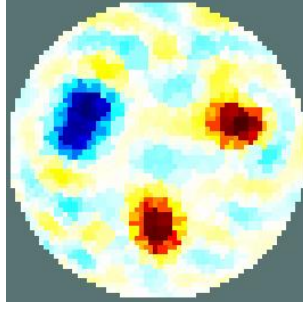
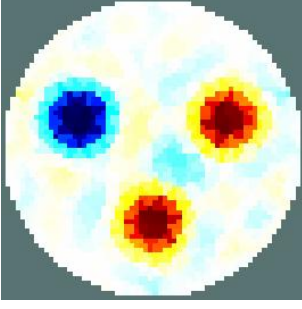
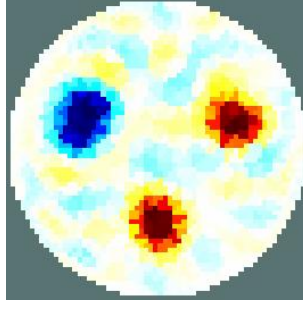
Laplace		
TV		
ExponentialCovar		
Noser		

Tabla C.3 continua en la siguiente página

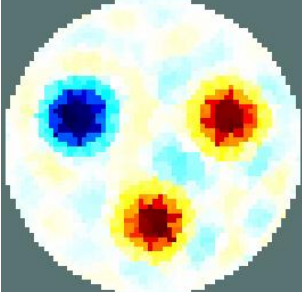
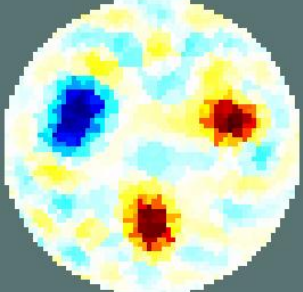
GaussianHPF		
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Tabla C.3: Resultados de imágenes en **Gauss Newton One Step**.

Gauss Newton Prior

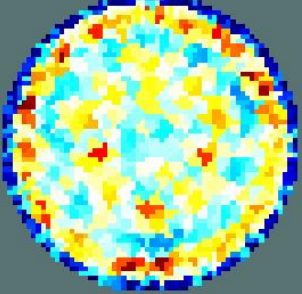
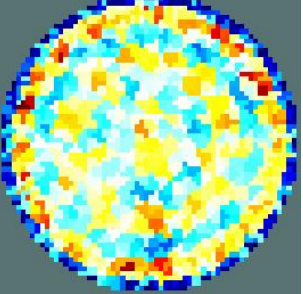
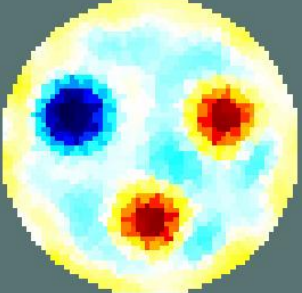
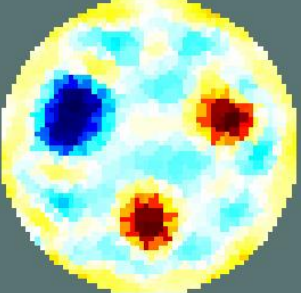
Gauss Newton Prior	Hiperparámetro=0.1	Hiperparámetro=0.01
Thikinov		
Laplace		

Tabla C.4 continua en la siguiente página.

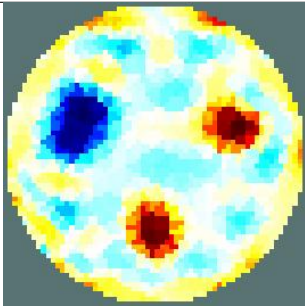
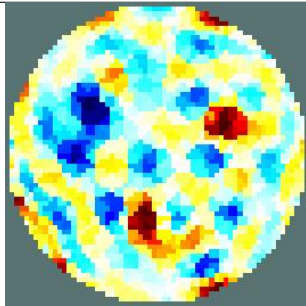
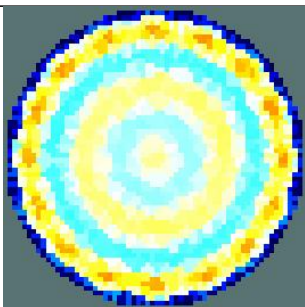
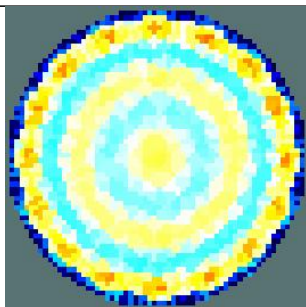
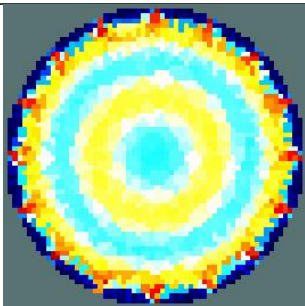
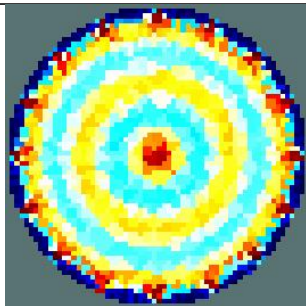
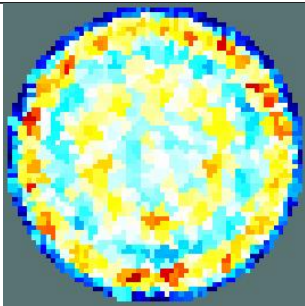
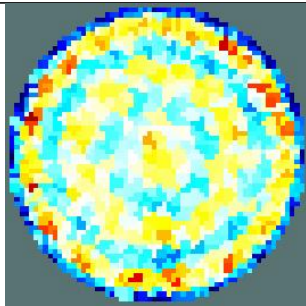
TV		
ExponentialCovar		
Noser		
GaussianHPF		

Tabla C.4: Resultados de imágenes en **Gauss Newton Prior**.

PDIPM Absolute

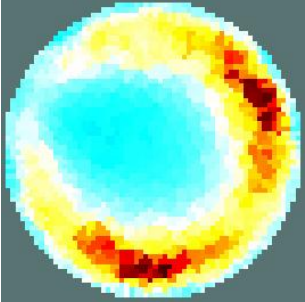
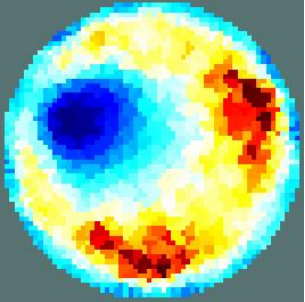
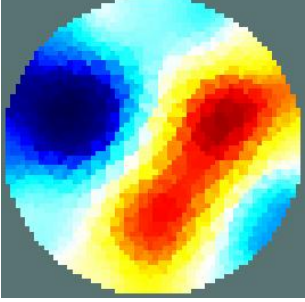
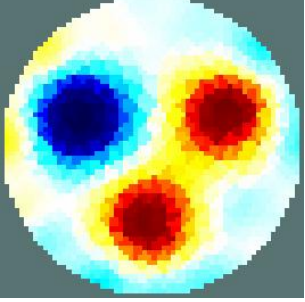
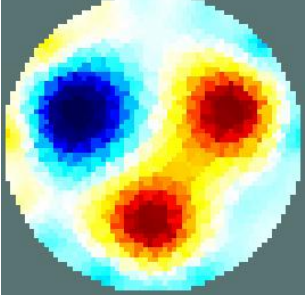
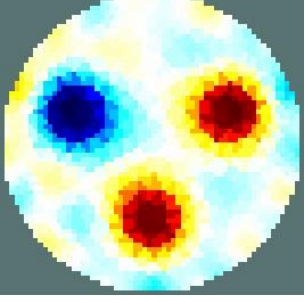
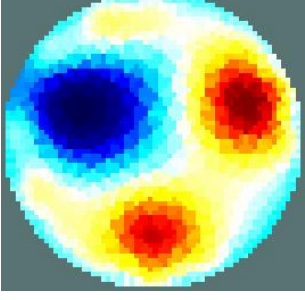
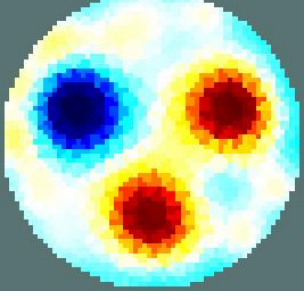
PDIPM Absolute	Hiperparámetro=0.1	Hiperparámetro=0.01
Thikinov		
Laplace		
TV		
ExponentialCovar		

Tabla C.5 continua en la siguiente página.

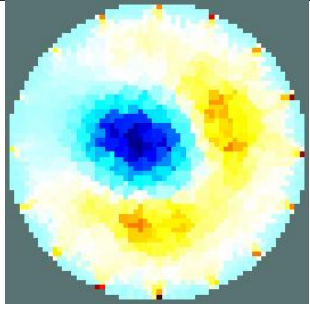
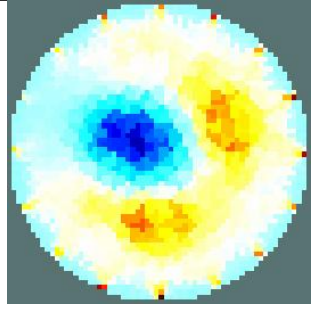
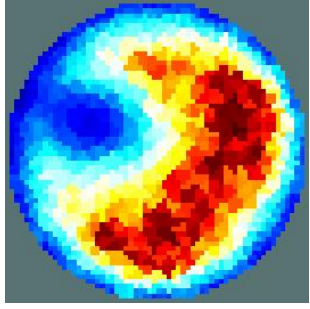
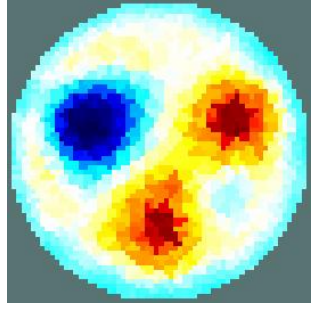
Noser		
GaussianHPF		

Tabla C.5: Resultados de imágenes en **PDIPM Absolute**.

PDIPM Difference

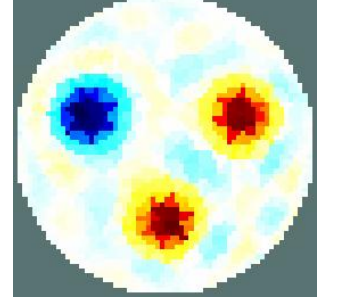
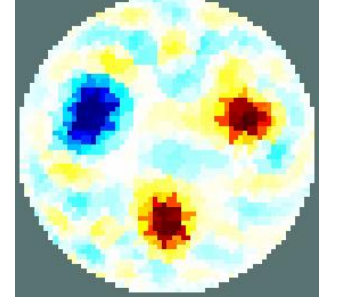
PDIPM Difference	Hiperparámetro=0.1	Hiperparámetro=0.01
Thikinov		

Tabla C.6 continua en la siguiente página.

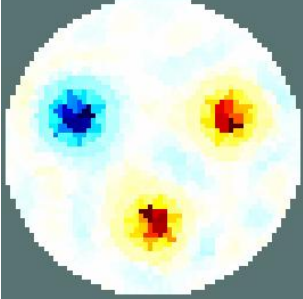
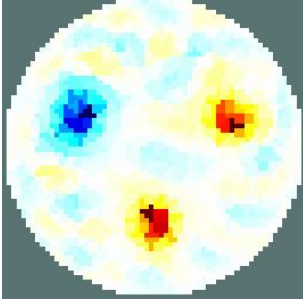
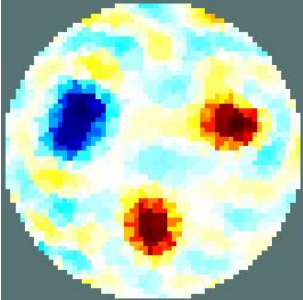
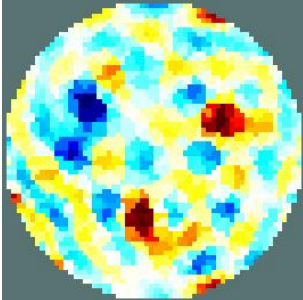
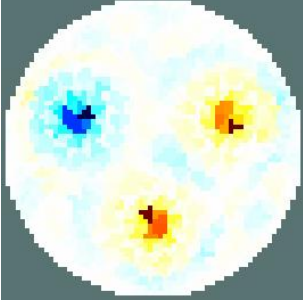
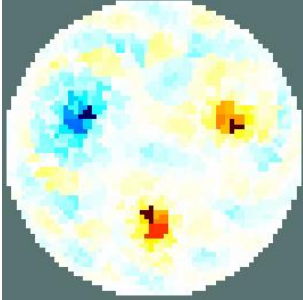
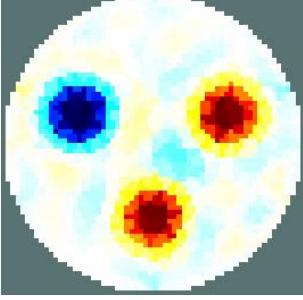
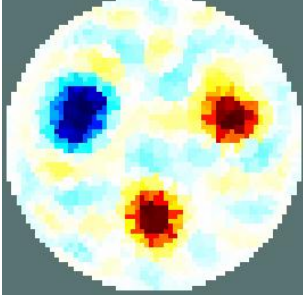
Laplace		
TV		
ExponentialCovar		
Noser		

Tabla C.6 continua en la siguiente página.

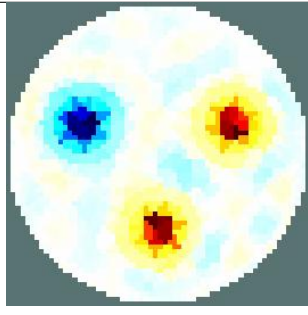
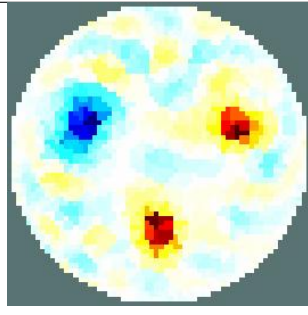
GaussianHPF		
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Tabla C.6: Resultados de imágenes en **PDIPM Difference**.

TV PDIPM

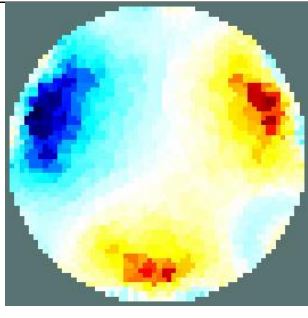
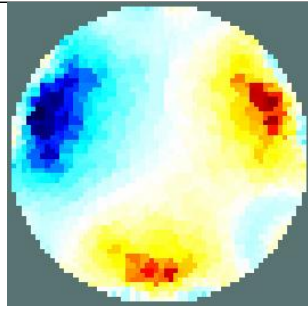
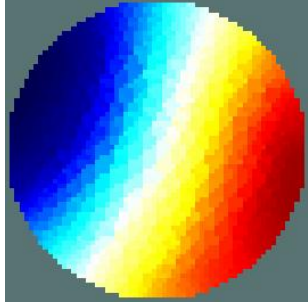
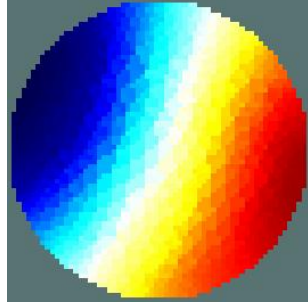
TV PDIPM	Hiperparámetro=0.1	Hiperparámetro=0.01
Thikinov		
Laplace		

Tabla C.7 continua en la siguiente página.

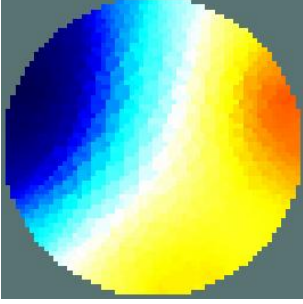
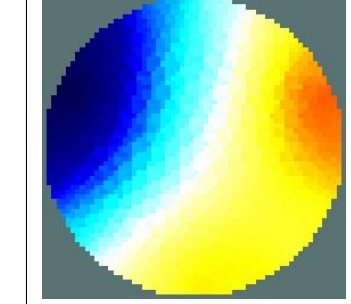
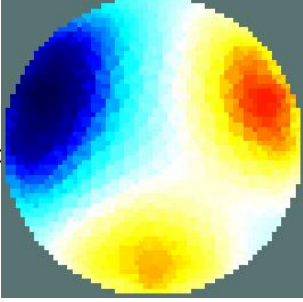
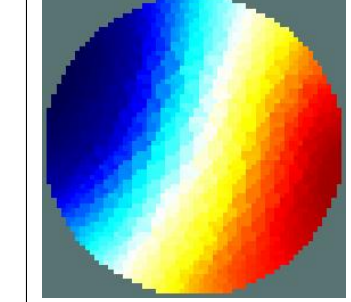
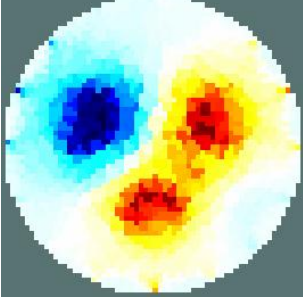
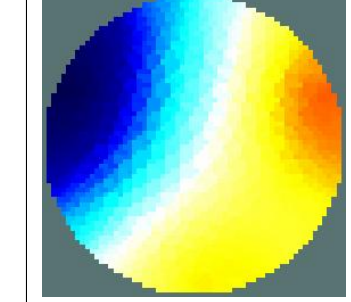
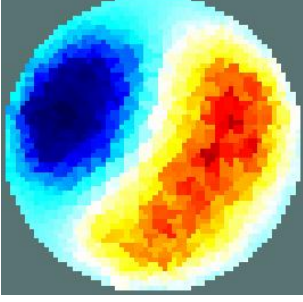
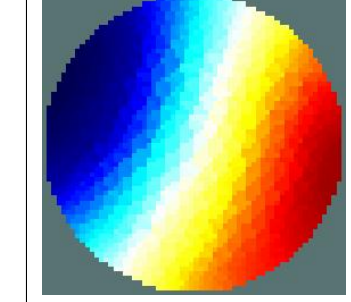
TV		
ExponentialCo		
Noser		
GaussianHPF		

Tabla C.7: Resultados de imágenes en TV PDIPM.

TV IRLS

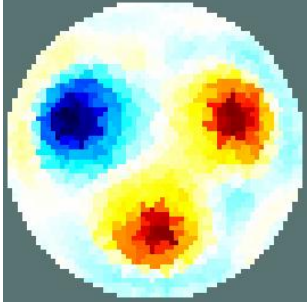
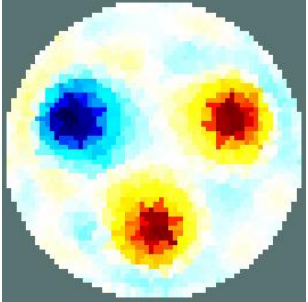
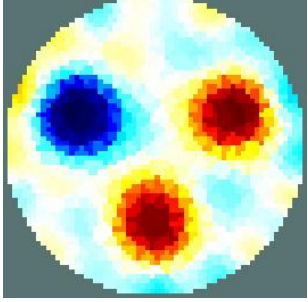
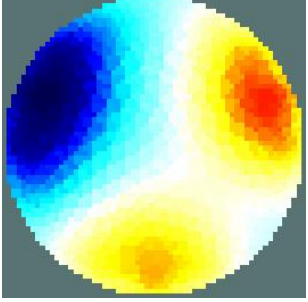
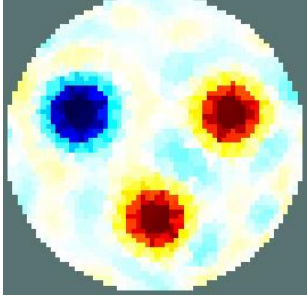
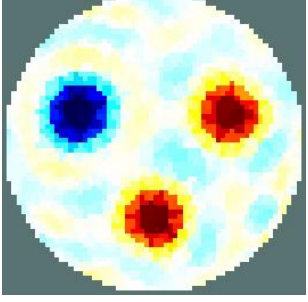
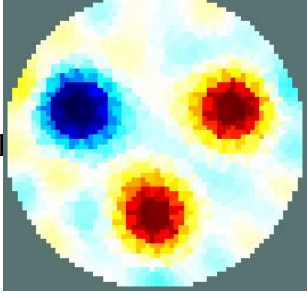
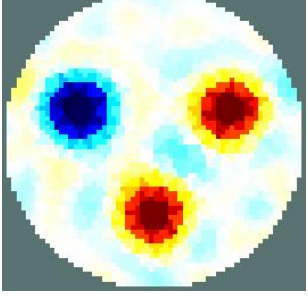
TV irls	Hiperparámetro=0.1	Hiperparámetro=0.01
Thikinov		
Laplace		
TV		
Exponential		

Tabla C.8 continua en la siguiente página

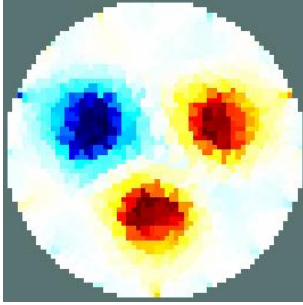
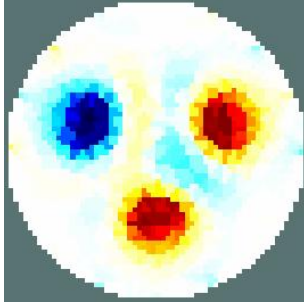
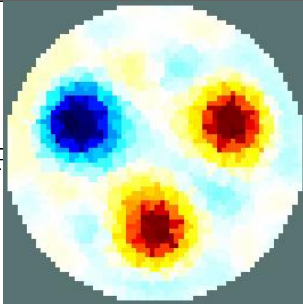
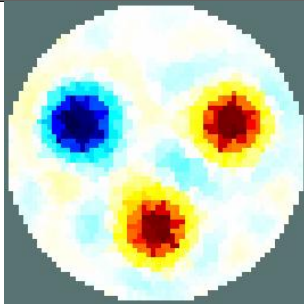
Noser		
GaussianHF		

Tabla C.8: Resultados de imágenes en TV irls.

TSVD

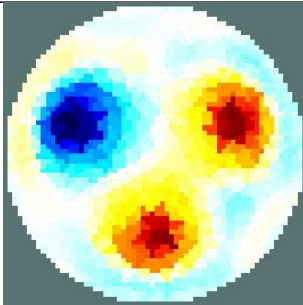
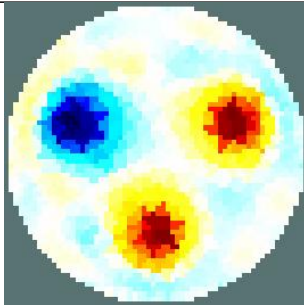
TSVD	Hiperparámetro=0.1	Hiperparámetro=0.01
-		

Tabla C.9: Resultados de imágenes en TSVD.

Kalman

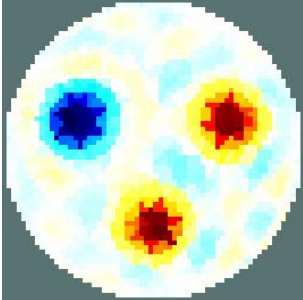
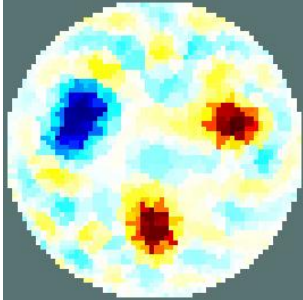
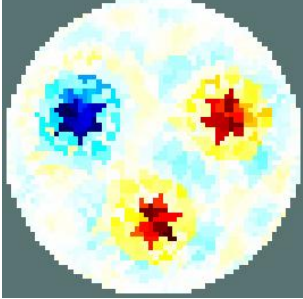
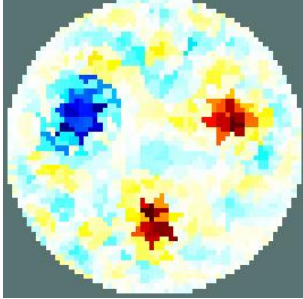
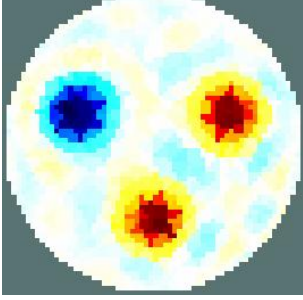
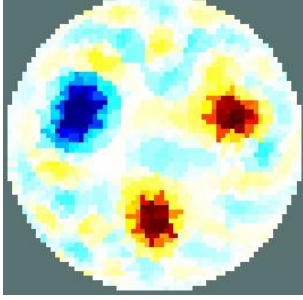
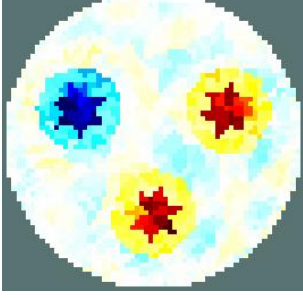
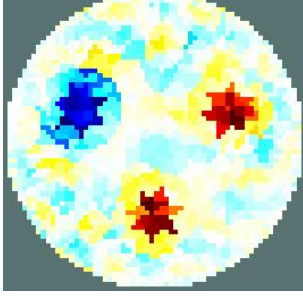
COARSE MODEL	Hiperparametro=0.1	Hiperparametro=0.01
Thikinov		
Laplace		
TV		
ExponentialCovar		

Tabla C.10 continua en la siguiente página.

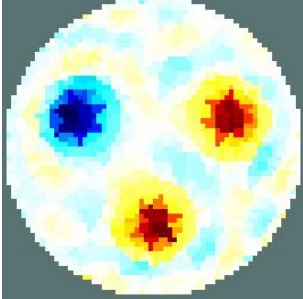
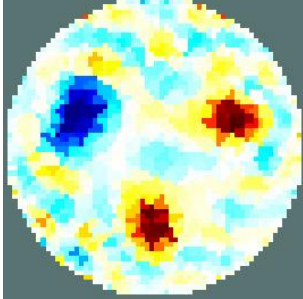
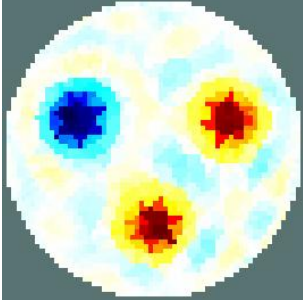
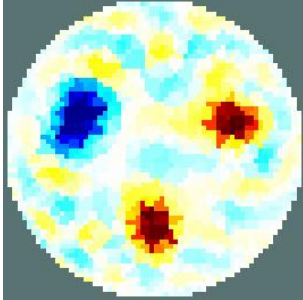
Noser		
GaussianHPF		

Tabla C.10: Resultados de imágenes en **TSVD**.

Back Projection

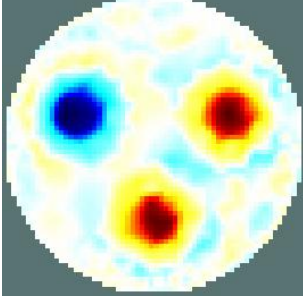
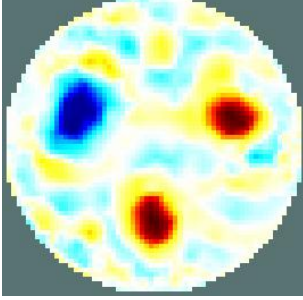
Back Projection	Hiperparámetro=0.1	Hiperparámetro=0.01
-		

Tabla C.11: Resultados de imágenes en **Back Projection**.

Apéndice D

Pantallas de navegación

Presentación

Es la pantalla de inicio, lleva una portada del programa

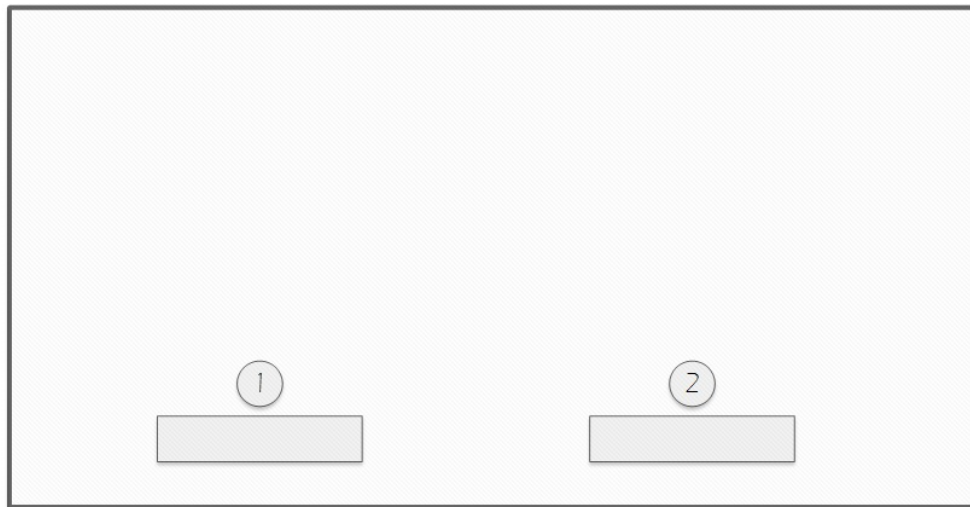


Figura D.1: Ventana de presentación.

Presentación	
1	Botón Salir
2	Botón Siguiente

Tabla D.1: Contenido de la pantalla de presentación.

Selección de base de datos

Se muestra un menú de base de datos para la selección del usuario, organizados por categorías como: Simulaciones, datos con animales, con tanques y datos con humanos.

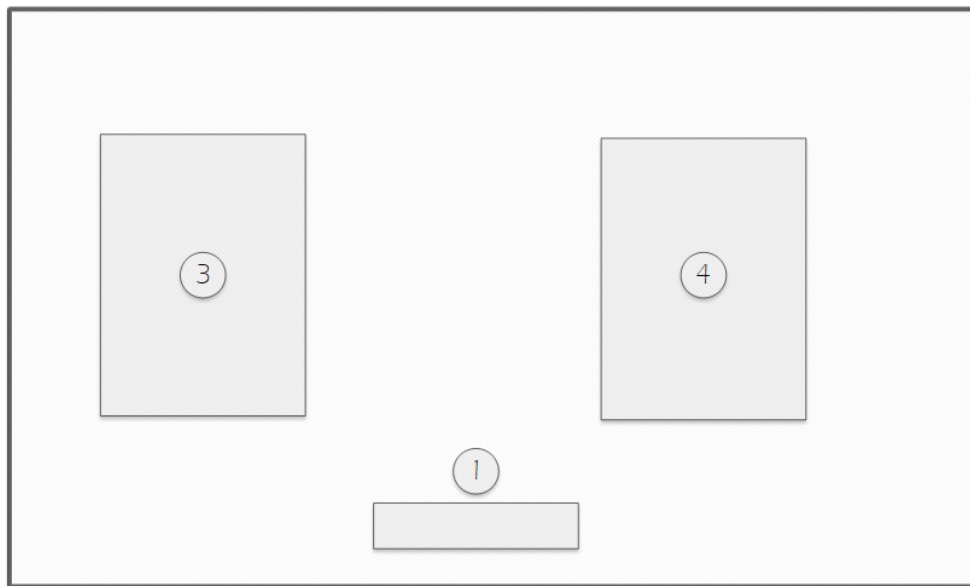


Figura D.2: Ventana de Menú de Bases de datos.

Menú bases de datos	
1	Botón Salir
3	Simulaciones
4	Pruebas en Humanos
5	Pruebas en Animales

Tabla D.2: Contenido de la ventana "Menú base de datos".

Menú principal

Es la ventana principal de la herramienta, se compone por las siguientes tres pestañas:

Reconstrucción

En esta parte el usuario puede seleccionar y/o digitar datos para la reconstrucción de imágenes EIT, las cuales se pueden ver en la misma pestaña. En caso de que sean reconstrucciones con datos reales, se habilita un botón para poder ver la secuencia (animación) y la imagen de prueba se remplazará por una reconstrucción con GREIT.

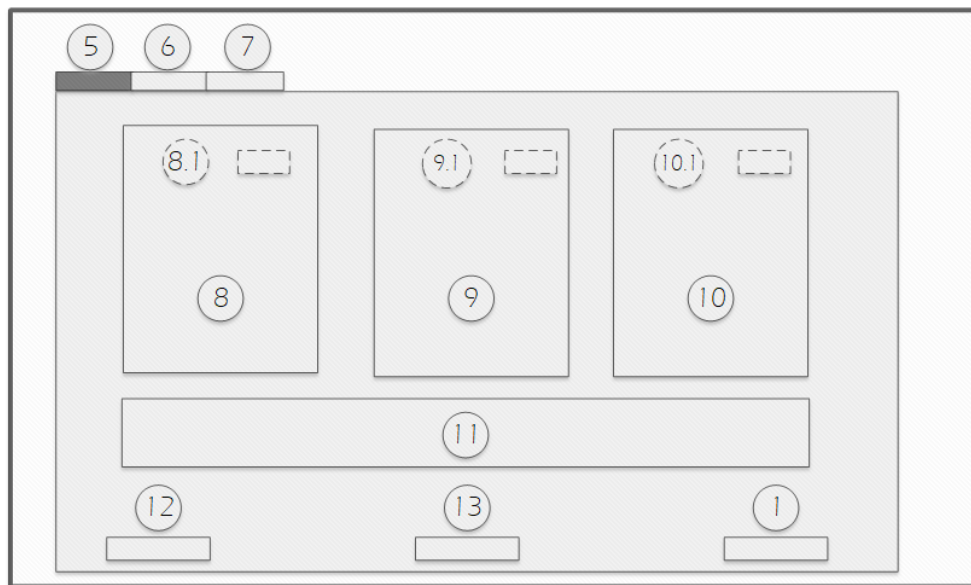


Figura D.3: Pantalla principal, pestaña de reconstrucción.

Menú principal-Reconstrucción	
1	Salir
6	Pestaña de Reconstrucción
7	Pestaña de Resultados
8	Pestaña de Análisis
9	Imagen de referencia o modelo GREIT
9.1	Ver animación Modelo GREIT
10	Imagen reconstrucción A
10.1	Ver animación de reconstrucción A
11	Imagen reconstrucción B
11.1	Ver animación de reconstrucción B
12	Panel de Parámetros y Métodos de reconstrucción
13	Botón Regresar
14	Botón Actualizar

Tabla D.3: Contenido de la pantalla de Menú principal-Reconstrucción.

Resultados

Se muestran los parámetros de Evaluación de cada imagen, el cual su contenido es: Modelo FEO o CEM, Algoritmo de reconstrucción, Tipo de regularización e índices comparativos.

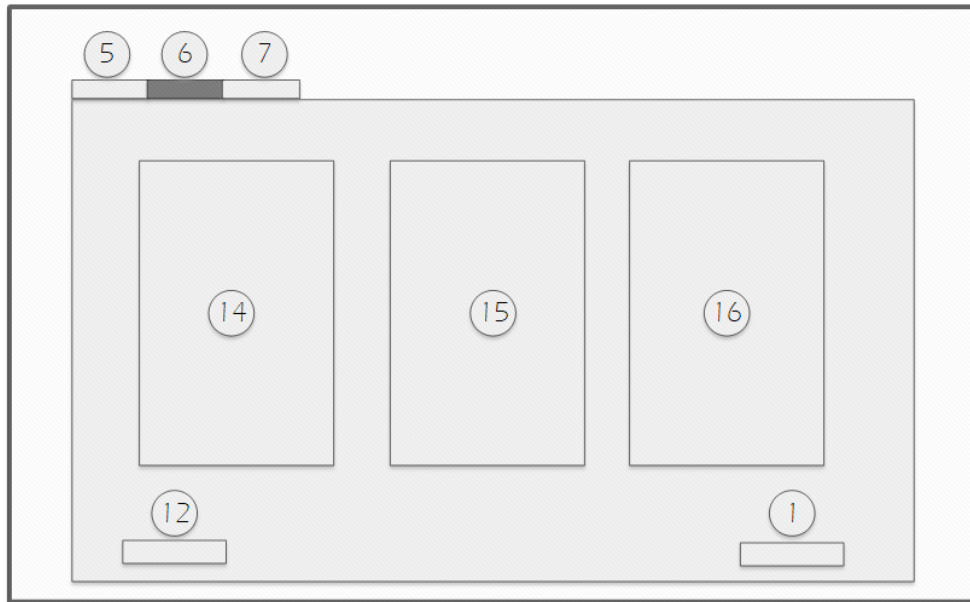


Figura D.4: Pantalla principal, pestaña de resultados.

Menú principal-Resultados	
1	Salir
6	Pestaña de Reconstrucción
7	Pestaña de Resultados
8	Pestaña de Análisis
15	Datos generales de imagen real o reconstrucción con GREIT
16	Resultados reconstrucción A
17	Resultados reconstrucción B
13	Botón Regresar

Tabla D.4: Contenido de la pantalla de Menú principal-Resultados.

Análisis

Se da una observación por parte del sistema definiendo cuál es la mejor reconstrucción entre los algoritmos seleccionados. También se muestran los histogramas de cada imagen, teniendo la opción de poder abrir una figura que proporciona mayor información y detalle

de estos mismos.

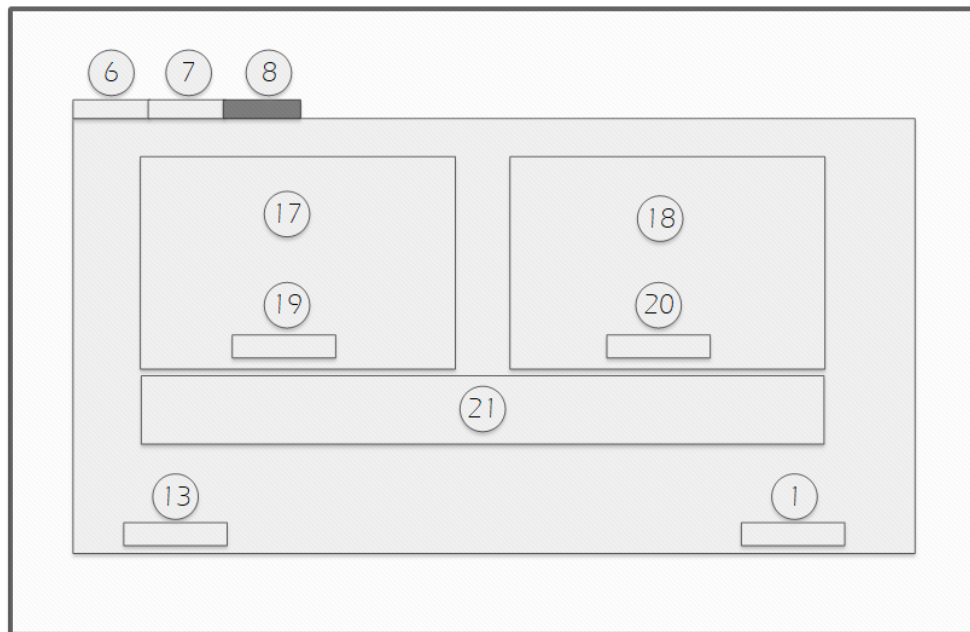


Figura D.5: Pantalla principal, pestaña de resultados.

Menú principal-Análisis	
1	Salir
6	Pestaña de Reconstrucción
7	Pestaña de Resultados
8	Pestaña de Análisis
13	Botón regresar
18	Histograma reconstrucción A
19	Histograma reconstrucción B
20	Botón para detallar histograma del modelo
21	Respuesta de comparación y Análisis

Tabla D.5: Contenido en la pantalla de Menú principal-Análisis.

Para el caso de análisis con datos reales, el contenido de resultados cambia por un análisis de reconstrucción pulmonar y apoyo de la EPOC según la base de datos seleccionada.

Secuencia de imágenes

Esta ventana sólo esta disponible para imágenes con datos reales.

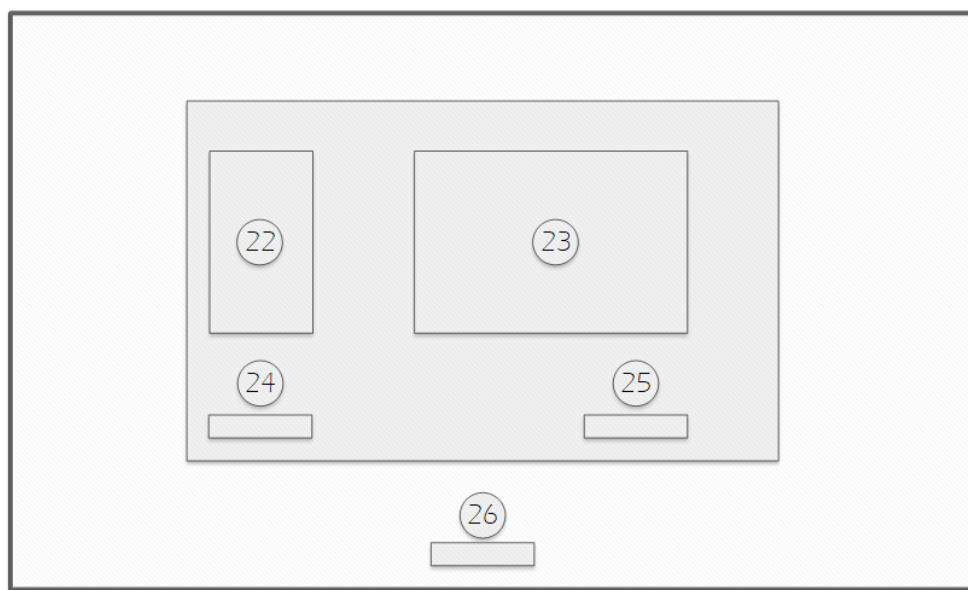


Figura D.6: Pantalla principal, pestaña de resultados.

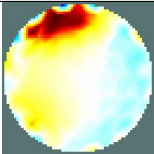
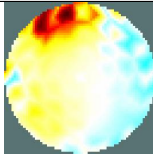
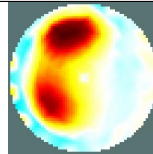
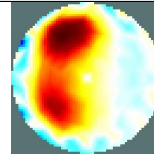
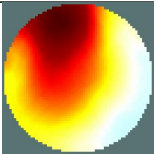
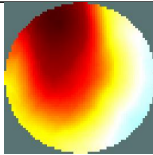
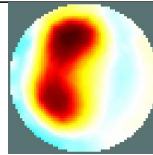
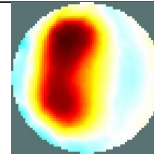
Pantalla de Animación	
22	Datos del Modelo
23	Secuencia de Imágenes
24	Botón Iniciar/Recargar secuencia
25	Selección de FPS
26	Botón para cerrar la ventana

Tabla D.6: Contenido en la ventana para animación.

Apéndice E

Resultados individuales de los mejores algoritmos

A continuación se presenta los resultados de los algoritmos *Conjugate Gradient*, *Coarse Model* y *Gauss Newton One-Step*, usando cambios de hiperparámetro entre 0.1 y 0.01 y estrategias de regularización

COARSE MODEL	Hiperparámetro=0.1		Hiperparámetro=0.01	
	FEM	CEM	FEM	CEM
Tikhonov				
Laplace				

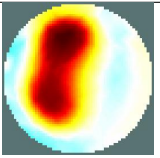
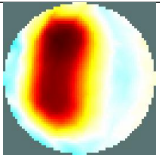
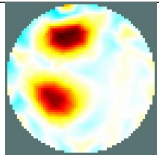
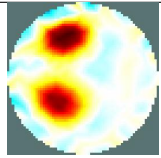
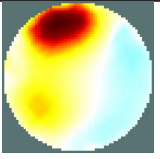
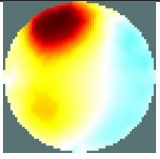
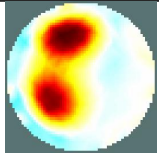
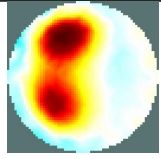
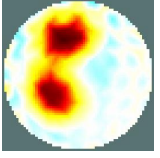
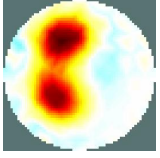
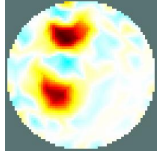
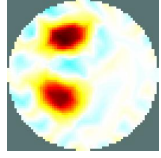
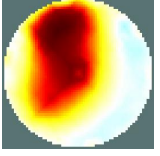
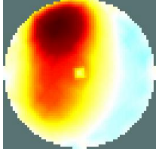
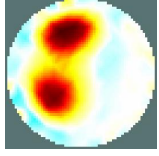
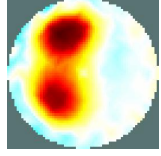
TV				
Exponential Covar				
Noser				
GaussianHPG				

Tabla E.1: Resultados de imágenes reconstruidas en **Coarse Model**.

Modelo Directo	Regularizacion	Hiperparámetro =0.1			Hiperparámetro =0.01		
		CC	DA	EP(%)	CC	DA	EP(%)
FEM	Tikhonov	0,6892	66098	11,5953673	0,7029	63208	11,0883836
FEM	Laplace	0,6935	68272	11,9767454	0,71	66085	11,5930868
FEM	TV	0,8167	44459	7,79930461	0,8623	40296	7,06900242
FEM	Exponential_Covar	0,74891	56669	9,94126707	0,803	48885	8,57574407
FEM	Noser	0,8111	42398	7,43774976	0,8483	41882	7,34722948
FEM	Gaussian_HPF	0,76477	53229	9,33779853	0,8355	43025	7,54774243
CEM	Tikhonov	0,6449	77198	13,5426059	0,6528	75092	13,1731569
CEM	Laplace	0,65848	76163	13,3610391	0,6849	71256	12,5002193
CEM	TV	0,8023	48262	8,46645311	0,8433	44355	7,78106021
CEM	Exponential_Covar	0,712	64901	11,3853813	0,7718	54856	9,6232181
CEM	Noser	0,8202	42105	7,38634968	0,8313	45277	7,94280381
CEM	Gaussian_HPF	0,7244	62144	10,9017294	0,8041	48972	8,59100621

Tabla E.2: Tabla de resultados para *Coarse Model*.

En la tabla E.3 se muestra la reconstrucción de imágenes usando el método *Coarse mo-*

del e imágenes obtenidas con los diferentes métodos de regularización. Los métodos con mejores datos estadísticos se encuentra en la tabla E.2, donde se destaca el método noser, sus datos estadísticos mejoraron al utilizar un valor de hiperparámetro mas bajo, el CC subió respecto al anterior valor de hiperparámetro acercándolo mas 1, y el DA y el EP disminuyeron. Otros métodos de regularización con datos estadísticos destacados son los métodos *exponential covar*, *Gaussian HPF* y *TV*, aunque sus mejores resultados se obtienen con valores de hiperparámetro en 0.1.

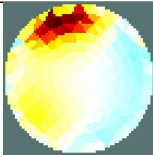
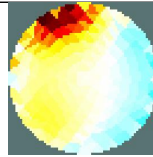
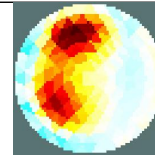
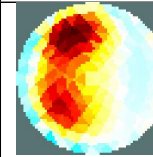
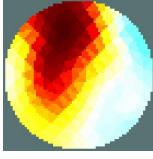
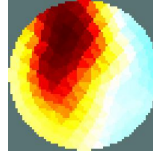
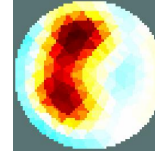
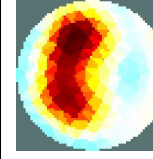
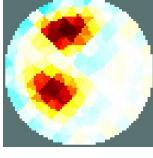
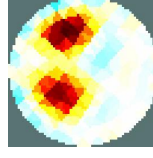
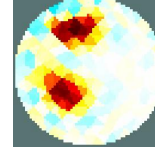
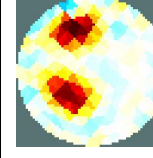
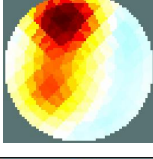
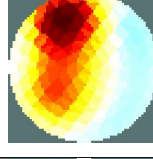
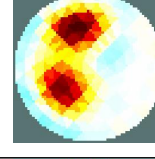
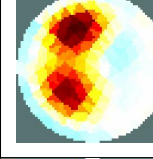
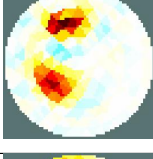
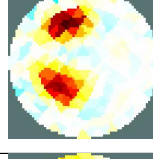
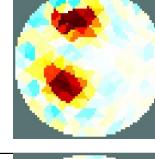
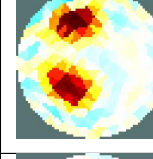
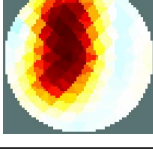
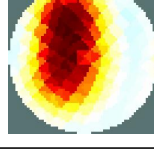
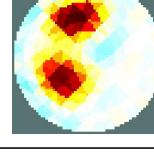
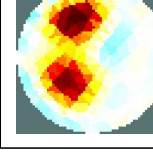
CONJUGATE GRADIENT	Hiperparametro=0.1		Hiperparametro=0.01	
	FEM	CEM	FEM	CEM
Tikhonov				
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla E.3: Resultados de imágenes reconstruidas con **Conjugate Gradient**.

Modelo Directo	Regularizacion	Hiperparámetro =0.1			Hiperparámetro =0.01		
		CC	DA	EP(%)	CC	DA	EP(%)
FEM	Tikhonov	0,3317	75236	13,1984184	0,7029	63208	11,0883836
FEM	Laplace	0,4947	103990	18,2426435	0,71	66085	11,5930868
FEM	TV	0,8504	41927	7,35512369	0,8623	40296	7,06900242
FEM	Exponential_Covar	0,5952	79051	13,867672	0,803	48885	8,57574407
FEM	Noser	0,8693	36129	6,33799852	0,8483	41882	7,34722948
FEM	Gaussian_HPFF	0,5748	82256	14,4299152	0,8355	43025	7,54774243
CEM	Tikhonov	0,2919	83955	14,7279655	0,6528	75092	13,1731569
CEM	Laplace	0,5008	111671	19,5900975	0,6849	71256	12,5002193
CEM	TV	0,8351	45451	7,97332809	0,8433	44355	7,78106021
CEM	Exponential_Covar	0,5731	88921	15,5991355	0,7718	54856	9,6232181
CEM	Noser	0,8692	37889	6,64674987	0,8313	45277	7,94280381
CEM	Gaussian_HPFF	0,5731	88446	15,5158077	0,8041	48972	8,59100621

Tabla E.4: Tabla de resultados para *Conjugate Gradient*.

La reconstrucción de imágenes usando el método *Conjugate gradient* se muestra en la tabla E.4, donde se observa las reconstrucciones con diferentes métodos, cabe resaltar que el método genera imágenes similares al modelo base, además los datos numéricos también demostraron que el método de reconstrucción funciona de manera óptima con hiperparámetros pequeños.

Respecto a los métodos de regularización con un valor de hiperparámetro de 0.1 destacan *TV* y *noser*, por sus valores de CC por encima de 0.8 y valores de DA y DP bajos en comparación con los demás métodos, con un valor de hiperparámetro de 0.01 destacan los métodos *exponencial covar* y *Gaussian HPF* en conjunto con los métodos anteriormente mencionados, con valores de CC por encima de 0.8.

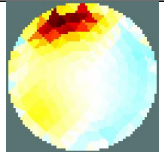
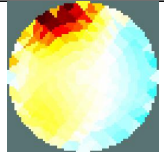
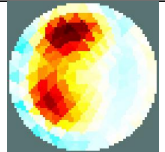
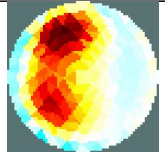
Gauss Newton One-Step	Hiperparametro=0.1		Hiperparametro=0.01	
	FEM	CEM	FEM	CEM
Thikinov				

Tabla E.5 continua en la siguiente página

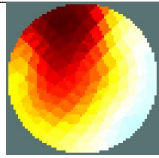
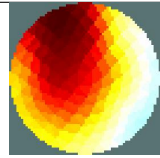
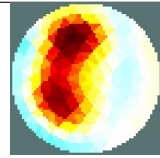
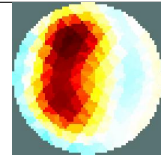
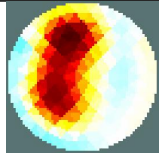
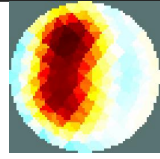
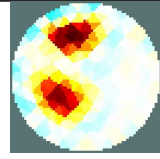
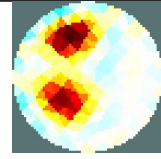
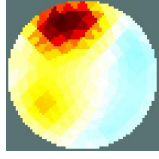
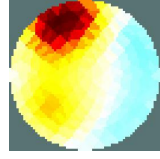
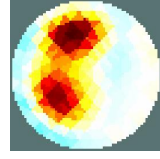
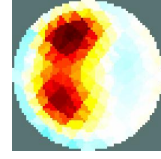
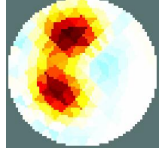
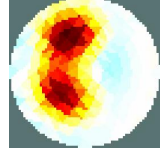
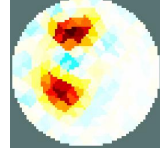
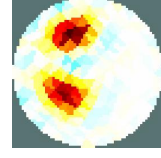
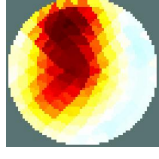
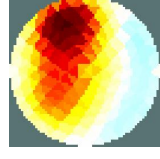
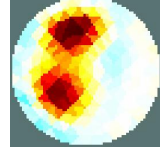
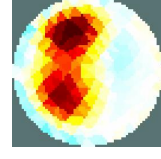
Laplace				
TV				
Exponential Covar				
Noser				
Gaussian HPF				

Tabla E.5: Resultados de imágenes en *Gauss Newton One sttep*.

Modelo Directo	Regularizacion	Hiperparámetro =0.1			Hiperparámetro =0.01		
		CC	DA	EP(%)	CC	DA	EP(%)
FEM	Tikhonov	0,3317	75236	13,1984184	0,7029	63208	11,0883836
FEM	Laplace	0,423	129969	22,8000589	0,7052	67549	11,8499118
FEM	TV	0,683	67963	11,9225385	0,8579	40091	7,0330399
FEM	Exponential_Covar	0,4836	79707	13,982752	0,7662	55473	9,7314565
FEM	Noser	0,7814	49363	8,65959813	0,8645	37509	6,58008764
FEM	Gaussian_HPF	0,5355	98141	17,2165715	0,783	52428	9,19728158
CEM	Tikhonov	0,2919	83955	14,7279655	0,6528	75092	13,1731569
CEM	Laplace	0,4193	143277	25,1346401	0,6656	76570	13,4324378
CEM	TV	0,6462	79848	14,0074872	0,8362	45659	8,00981689
CEM	Exponential_Covar	0,4531	90129	15,8110512	0,7252	64478	11,3111757
CEM	Noser	0,7548	55045	9,65637379	0,8647	38402	6,73674387
CEM	Gaussian_HPF	0,5487	95303	16,71871	0,7353	61876	10,8547149

Tabla E.6: Tabla de resultados para *Gauss Newton-One sttep*.

El método *Gauss Newton one step* demostró una reconstrucción más dispersa en la malla, como se muestra en la tabla E.5, pero con un valor de hiperparámetro bajo, esa dispersión se ve reducida, los datos respectivos a CC, DA y EP se consignan en las tabla E.6 con sus valores de hiperparámetro respectivos. El método *noser* se destaca por sus datos estadísticos en los dos valores de hiperparámetro, solo variando unas cuantas décimas entre valores de hiperparámetro.

A partir de las tablas E.2 E.4 y E.6, se observa que el mejor método de regularización entre los evaluados con diferentes valores de hiperparámetro y reconstrucción es el método *noser*, dado que la variación de sus resultados estadísticos mejoran al cambiar el valor de hiperparámetro del valor 0.1 a 0.01, a diferencia de los demás métodos donde sus mejores resultados se obtienen con el valor de 0.01, además, con un valor de 0.1 los valores estadísticos no son los mejores llegando a tener valores de CC en 0.3, de esta manera el método *noser* es el más adecuado para reconstrucción de imágenes.

Apéndice F

Análisis de comparación para datos simulados

Para que el sistema defina autónomamente cual de los dos modelos seleccionados tiene mejor respuesta, nos guiaremos por medio del CC. la figura F.1 muestra los pasos del algoritmo.

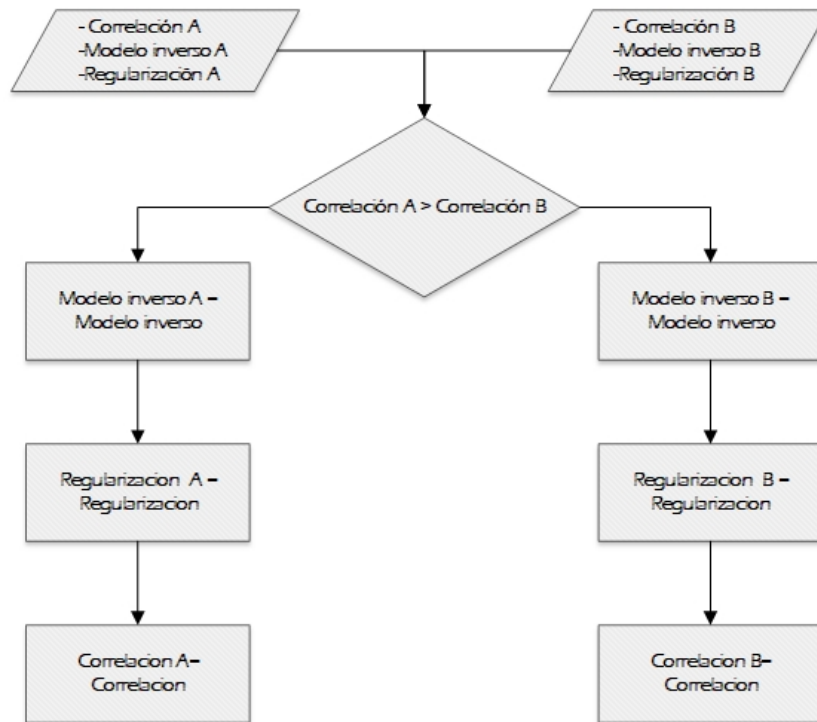


Figura F.1: Algoritmo que almacena el mejor CC entre dos reconstrucciones.

La figura F.2 define el mejor índice de correlación, una vez definido se envían al sistema las variables correspondientes a este resultado como: Enumeración del modelo (A o B), Modelo método inverso y regularización, para luego ser mostradas en la interfaz.

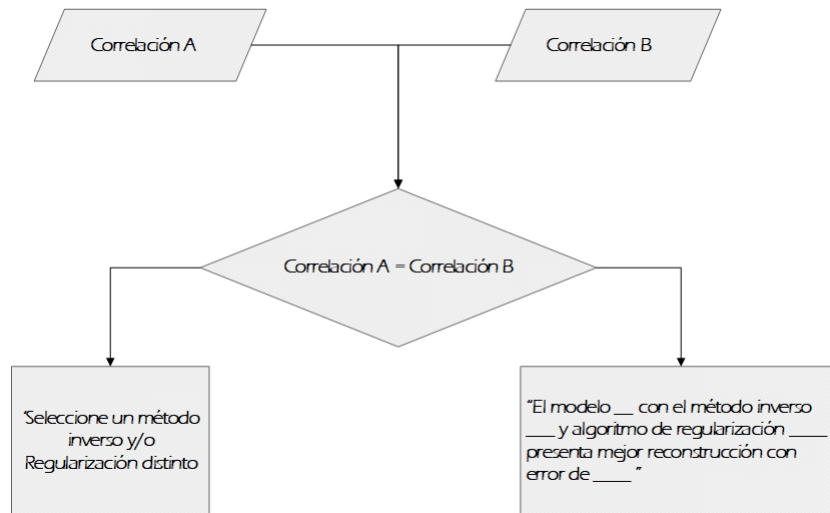


Figura F.2: Algoritmo para ver la igualdad de CC.

Si durante el funcionamiento de la interfaz se seleccionan los mismos métodos de reconstrucción y regularización en los dos modelos, darán como resultado un CC de igual valor, para este caso el sistema despliega el mensaje: *Selecciona una solución inversa y/o regularización diferente entre ambos modelos.* En caso contrario sería: *El modelo inverso "Sea A o B" con solución inversa .Aquí el nombre del método inverso y regularización .Aquí el nombre la regularización" tiene un índice de correlación "Valor de la mejor correlación".*