**Reconstruction**

See ‘D:\Depth electrode github example\Rat\_055\Reconstruction’ on harddrive or ‘eit-nas/shared/Mayo Depth electrode github example\Rat\_055\Reconstruction’ on eit-nas for example of output from various steps

1. **Reconstruction – Tikhonov 0**

Overview

Reconstruction when using zero-order Tikhonov regularisation. Options for reconstructing with just depth data, just cortical data or both data together.

Code/files required

1. recon\_depth\_probes\_tik0.m
2. tikhonov\_CV.m
3. J\_hex\_depth.mat and/or J\_hex\_cortex.mat
4. BV\_depth.mat and/or BV\_cortex.mat
5. EIT\_depth\_data.mat, EIT\_cortex\_data.mat or EIT\_both\_data.mat

Input

1. Change type to 1,2,3 or 4 depending on what data you want to reconstruct
   * Type 1 – depth data alone
   * Type 2 – cortex data alone
   * Type 3 – depth followed by cortex (i.e collect data for all depth protocol lines and then collect data for all cortical protocol lines)
   * Type 4 – depth and cortex together
2. Line7,34,52,58 – change i to the number of protocol lines

Output

1. X - reconstructed conductivity change for each time point
2. SD - reconstructed noise for lambda at each time point
3. cv\_error – error for each lambda for each time point
4. lambda – range of lambda values explored
5. opt – chosen lambda value for each time point
6. **Reconstruction - Tikhonov 1**

Overview

Reconstruction when using first-order Tikhonov regularisation. Options for reconstructing with just depth data or just cortical data

Code/files required

1. recon\_depth\_probes\_tik1.m
2. gen\_Laplacian\_matrix.m
3. cgsvd.m
4. Mesh\_rods\_ratXX\_hex.mat
5. BV\_depth.mat or BV\_cortex.mat
6. J\_hex\_depth.mat or J\_hex\_cortex.mat
7. EIT\_depth\_data.mat or EIT\_cortex\_data.mat

Input

1. Change type to 1, 2 or 3 depending on what data you want to reconstruct
   * Type 1 – simulations
   * Type 2 – depth data alone
   * Type 3 – cortex data alone
2. Line 17 and 45 – change i to the number of protocol lines you have
3. Line 147 – change time point of dZ to maximum time point of activity in data
4. Line 157 and 170 – change lambda value depending if necessary

Output

1. x\_lambda – recon at specified time point for all lambda values (useful for checking what value to set lambda in line 157 and 170)
2. X\_recon – reconstructed conductivity change at each time point
3. SD\_recon – standard deviation of reconstructed noise
4. Lambda\_vec – range of lambda values explored
5. Lambda – chosen lambda value