

Take Home Exam (Spring 2015)

- Answers should be written either in English or Korean.
 - Send both your programs and results by e-mail (ejwoo@khu.ac.kr) no later than noon, June 20. You may use PowerPoint for the results.
 - You can use the provided example programs.
 - You should work independently.
- (1) Consider a homogeneous two-dimensional square domain with 30 cm length in each side. The conductivity inside the domain is 1 S/m. There exist a certain number of current dipole sources inside the domain. Attaching 40 point electrodes equally spaced on the surface of the domain, voltages between all pairs of neighboring electrodes were measured. Using the following voltage data sets, find the locations, magnitudes and directions of the current source dipoles and plot their images. Discretize the domain into 20×20 elements as an inverse mesh.
- (a) Use “OneSourceData” from the domain with a single current source.
 - (b) Use “TwoSourceData” from the domain with two current sources.
 - (c) Use “ThreeSourceData” from the domain with three current sources.
 - (d) Use “FourSourceData” from the domain with four current sources.
- (2) Consider an inhomogeneous two-dimensional square domain with 30 cm length in each side. It has a background region of 1 S/m conductivity and a few anomalies with unknown conductivity values, sizes and locations. Attaching 16 point electrodes equally spaced on the surface of the square, current of 1 mA was injected between a chosen pair of neighboring electrodes. Induced boundary voltages were measured from all neighboring pairs of the electrodes. For 16 different neighboring current injections, the total number of measured boundary voltage data was 16×16 . For each of the following cases, reconstruct an image of the conductivity distribution inside the domain. Discretize the domain into 40×40 elements as an inverse mesh. Ignore the effects of the contact impedances.
- (a) For the domain with a single anomaly, use the data set “OneAnomalyData”.
 - (b) For the domain with two anomalies, use the data set “TwoAnomalyData”.
 - (c) For the domain with three anomalies, use the data set “ThreeAnomalyData”.
 - (d) For the domain with four anomalies, use the data set “FourAnomalyData”.