Readme - IP4DI modified for TGV

Overview

This software allows the 2.5D inversion of ERT data using TGV, l2 and TV (l1) regularisation methods. It is based on the versatile ERT and IP inversion software IP4DI[1,2], although only single lines of surface electrodes are supported. The IP4DI manual provides an overview of the majority of the functions involved, as well as the data input structure.

Running inversions

The inversion process is controlled via two scripts:

script_contol_batch.m [l_2 and TV regularised inversions]

TGV_script_batch.m [TGV regularised inversions]

The input/output filenames and inversion parameters can be set from the script, with each parameter explained in the comments.

File types

The file format used is the IP4DI .d data format, which is described in the original IP4DI manual supplied with this code. Alternately, the .dat file format used in the res2dinv software[3] can be used, given the number of header lines in the file. The variable 'res2d_flag' specifies the file type (0=IP4di, 1=res2dinv general, 2 = res2dinv dipole-dipole). If errors are present, they will be used directly to weight the data if Wd_flag = 1, therefore any error modelling should be performed prior to input into IP4DI.

Demo data

The *demodata* folder contains some example data files. Data from the three synthetic models used in the paper are contained in *big_block.dat, diag_block.dat* and *gauss.dat*. These are all in the res2dinv dipole-dipole format, with 6 headerlines. The corresponding *.mat* files contain the resistivity models. Additional data in the *.d* format are included from the original IP4DI distribution.

References

1- Karaoulis, M., Revil, A., Tsourlos, P., Werkema, D.D. and Minsley, B.J., 2013. IP4DI: A software for time-lapse 2D/3D DC-resistivity and induced polarization tomography. *Computers & Geosciences*, *54*, pp.164-170. DOI: http://dx.doi.org/10.1016/j.cageo.2013.01.008

2- Latest IP4DI code https://github.com/mariosgeo/ipi4d

3- https://www.geotomosoft.com/