



A comparative study among different regularization techniques for solving ill-posed magnetic inverse problem

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The magnetic inverse problem is, intrinsically, non-unique and its numerical solution is unstable. This means that any small perturbation in the data (noise) causes large variation in the solution. This ill-posedness is not only due to complex geological situations, but it may arise because of ill-conditioned kernel matrix. Procedures adopted to stabilize the inversion of ill-posed problem are called regularization, so the selection of regularization parameter is very important to invert the earth model causing the measured magnetic field. Two strategies are commonly used, techniques based on Tikhonov formula and techniques using the trust region sub-problem TRS and the controlling factor will be the radius of such region. In this study, the two categories are compared to examine the stability of solutions with noise. A MATLAB-based inversion code is implemented and tested on some synthetic total magnetic fields with different noise levels added to simulate real fields. The capability of such techniques have been further tested by applying it to real data.