

Prosjektoppgave / Diplomoppgave at Statoil's research center

CSEM inversion strategy

Marine Controlled Source Electro Magnetic (CSEM) inversion is a relatively new method for detecting and imaging hydrocarbon reservoirs located in the subsurface below the seabed. 3D imaging is done in practice by iterative inversion of the CSEM data.

At each iteration, inversion consists of first calculating a descent direction and then doing a line search along that direction. For 1D and 2D problems Gauss-Newton algorithms are normally used to calculate the descent direction. For 3D problems Gauss-Newton inversion is too heavy and quasi-Newton methods are preferred. For both types of methods different line search techniques and strategies can be used. In addition, the inversion problem must be stabilized by regularization and choosing the right type and amount of regularization is not obvious. Because 3D inversion is a very computer intensive process one cannot afford to try many different sets of parameters. It is therefore essential to define the best possible inversion strategy.

The work will consist of testing and comparing different inversion strategies for 1D inversion. Because 1D inversion is cheap, it will be possible to have a comprehensive set of tests and to define an optimal approach. The experience gained during the project will be very useful for designing efficient 3D inversion strategies.

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