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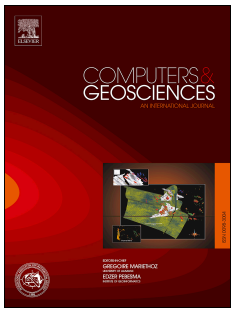


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# Stress estimation in reservoirs using an integrated inverse method

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## Abstract

Estimating the stress in reservoirs and their surroundings prior to the production is a key issue for reservoir management planning. In this study, we propose an integrated inverse method to estimate such initial stress state. The 3D stress state is constructed with the displacement-based finite element method assuming linear isotropic elasticity and small perturbations in the current geometry of the geological structures. The Neumann boundary conditions are defined as piecewise linear functions of depth. The discontinuous functions are determined with the CMA-ES (Covariance Matrix Adaptation Evolution Strategy) optimization algorithm to fit wellbore stress data deduced from leak-off tests and breakouts. The disregard of the geological history and the simplified rheological assumptions mean that only the stress field, statically admissible and matching the wellbore data should be exploited. The spatial domain of validity of this statement is assessed by comparing the stress estimations for a synthetic folded structure of finite amplitude with a history constructed assuming a viscous response.

*Keywords:* Inverse Problem, 3D stress field, Integrated libraries

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