

11.09. Effect of mudrock stress-level dependency on FES pressure prediction

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ABSTRACT

We investigate the effect of mudrock stress-level dependency on pore pressure and stresses predicted from the velocity of mudrocks. The Full-Effective-Stress (FES) method is used along with the stress-dependent Modified Cam Clay (SD-MCC) model to predict pore pressure and stresses from seismic velocity along a transect in the Mad Dog Field, Gulf of Mexico. Lab data from tests on resedimented mudrock samples from Eugene Island, Gulf of Mexico, are used to calibrate the parameters of the SD-MCC model. Predicted overpressures differ by up to 25% (Fig. 1), the least principal stresses increase slightly, and the margin of appropriate mud weights for drilling wellbores differ by up to 60% (Fig. 2). Our study shows that stress dependency of mudrock properties can significantly affect seismic prediction of pore pressure and stresses.

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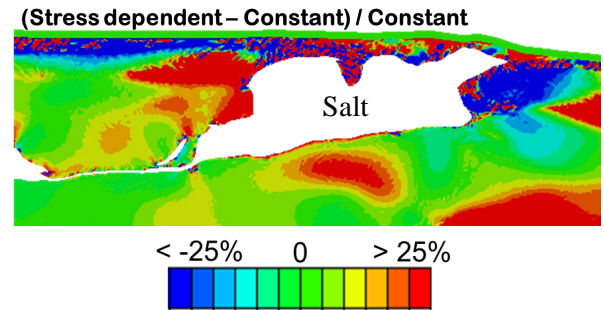


Fig. 1: Relative difference between overpressures predicted by the stress-dependent and the stress-independent models.

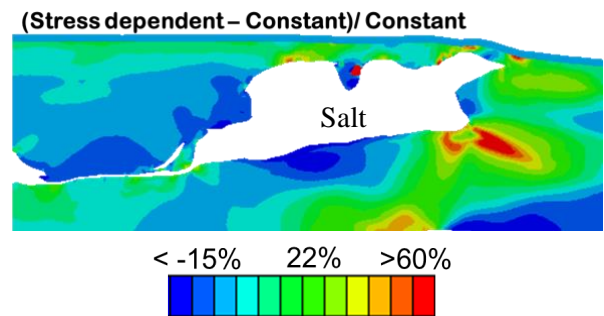


Fig. 2: Relative difference between margin of appropriate drilling mud weights predicted by the stress-dependent and the stress-independent models.

(Stress dependent – Constant) / Constant

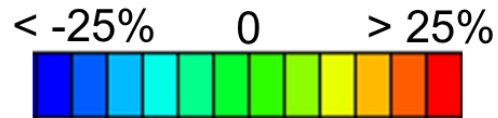
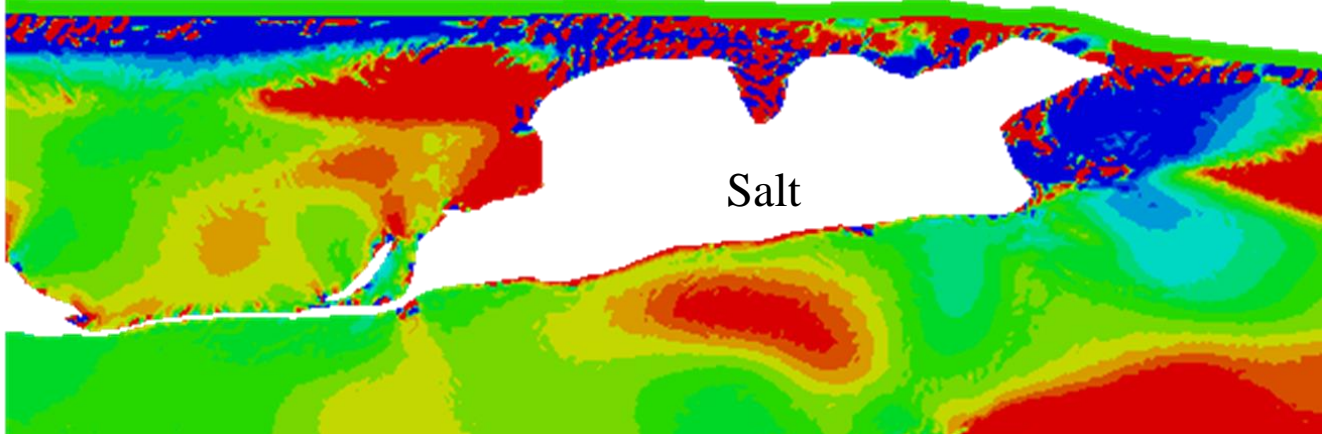


Fig. 1: Relative difference between overpressures predicted by the stress-dependent and the stress-independent models.

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(Stress dependent – Constant)/ Constant

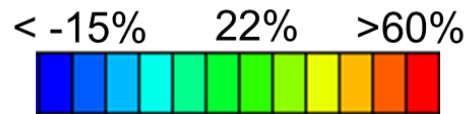
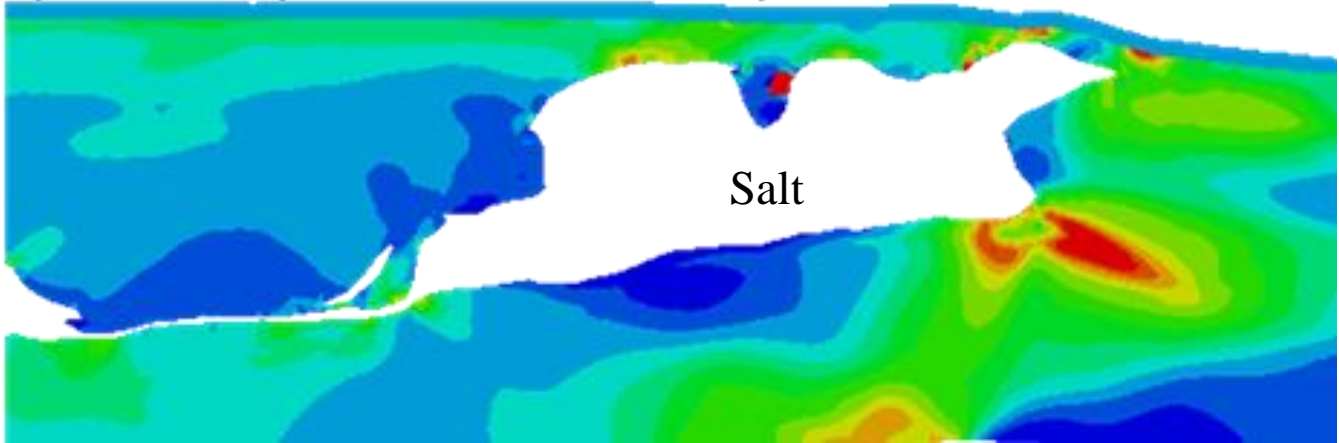


Fig. 2: Relative difference between margin of appropriate drilling mud weights predicted by the stress-dependent and the stress-independent models.

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