

09.03: Pressure Prediction: From Vertical Stress to the Full Stress Tensor: UT-FAST-P³ Software

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ABSTRACT

I present the new GeoFluids UT-FAST-P³ software. UT-FAST-P³ allows users to predict and compare pore pressure using 3 methods: the traditional vertical effective stress (VES) approach, the mean effective stress (MES) approach, and the full stress tensor (FES) approach (Fig. 1). Users can input measured velocity and overburden values, as well as a uniaxial velocity model and a frictional strength. I showcase this tool to demonstrate the relative contribution of mean and deviatoric (shear) stress to pore pressure for a range of effective-stress-ratios (Fig. 2). I illustrate that the FES method always predicts pore pressure higher than the VES method in non-uniaxial conditions (Fig. 2). In contrast, the MES approach only predicts pressure higher than VES when the stress ratio is higher than uniaxial. The UT-FAST-P³ software is available to all consortium members through this [link](#).

CLICK ON IMAGE FOR LARGER VIEW

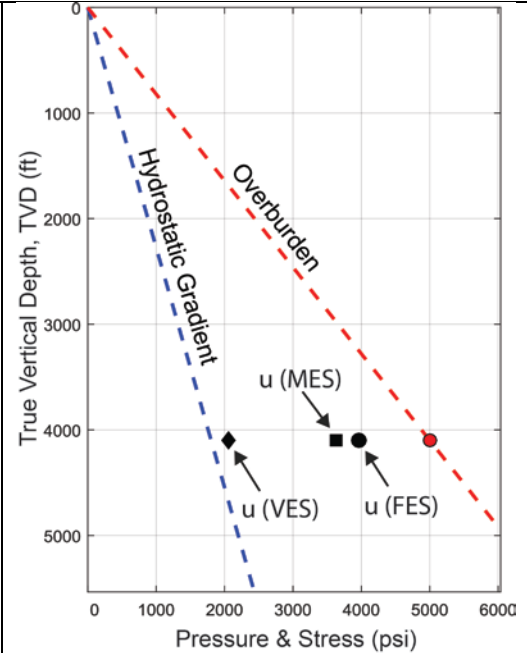


Fig 1: Example output of UT-FAST-P³: VES, MES, and FES pore-pressure predictions for a given velocity, overburden, and stress ratio.

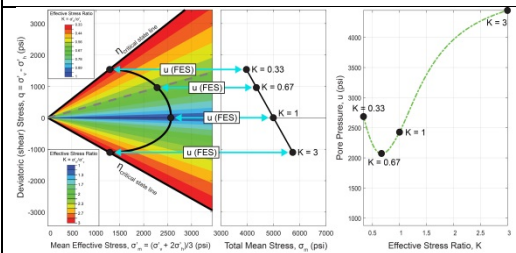


Fig 2: Example output for FES method: a) (left) mean-stress – deviatoric stress plot. Each color represents an effective stress ratio, K. Curved black line shows iso-velocity curve for given velocity. Mean effective stress changes as shear is increased or decreased (through K). b) (middle) Variation in total mean stress with K. c) (right) Variation in FES pore pressure prediction with K.

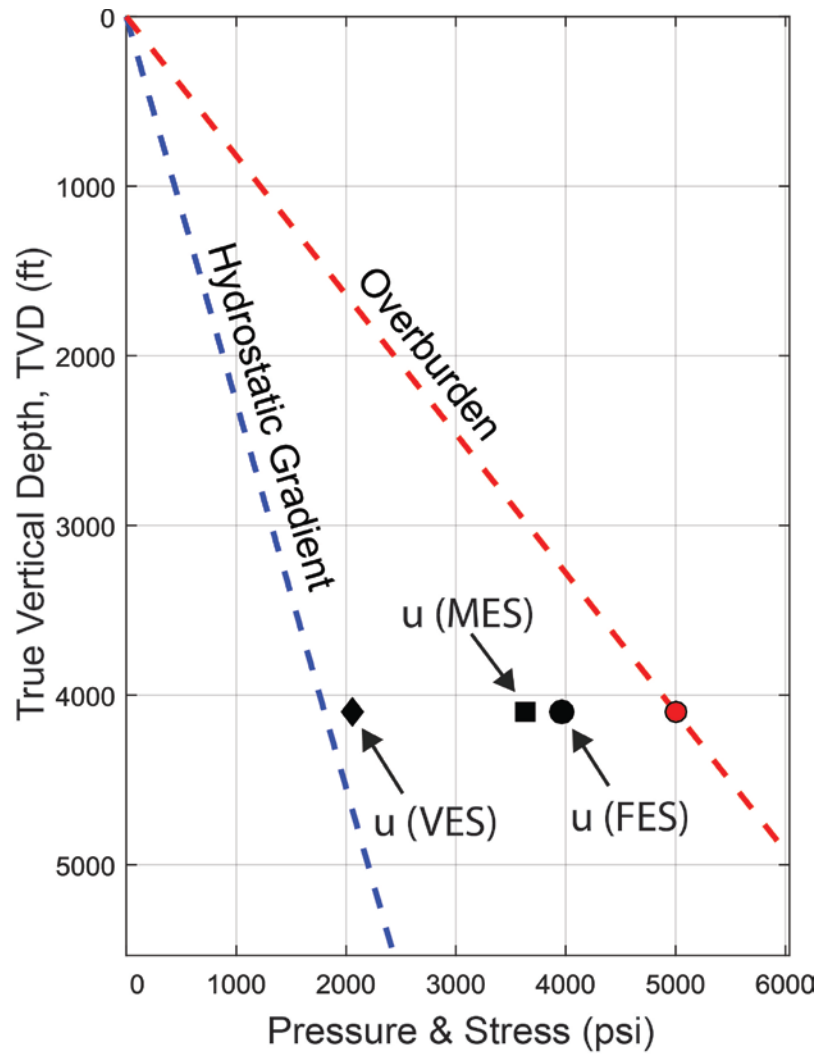


Fig. 1: Example output of UT-FAST-P3: VES, MES, and FES pore-pressure predictions for a given velocity, overburden, and stress ratio.

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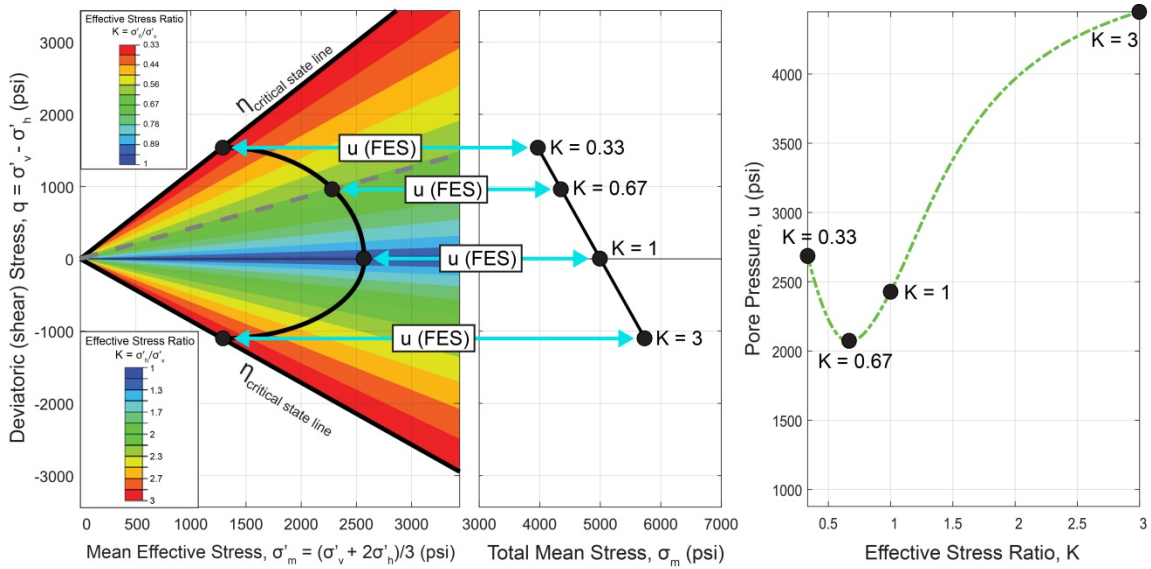


Fig. 2: Example output for FES method: a) (left) mean-stress – deviatoric stress plot. Each color represents an effective stress ratio, K . Curved black line shows iso-velocity curve for given velocity. Mean effective stress changes as shear is increased or decreased (through K). b) (middle) Variation in total mean stress with K . c) (right) Variation in FES pore pressure prediction with K .

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