

A Heuristic Interpretation of the Elastic Model for Minimum Horizontal Stress Estimation

*Chris Bird, Matt Torriero, Lauren Zvanciuk, Farhan Alimahomed
ARC Resources Ltd.*

Summary

Thiercelin and Plumb (1994) developed an elastic model for estimating horizontal principal stresses which depend on poisson's ratio and young's moduls, which can be obtained from well logs. The method also depends on the biot coefficient and horizontal strain constants which can be used as fitting parameters to match the resulting calculated horizontal stress curves to field measurements of the horizontal stresses (such as DFIT data).

We present an interpretation of this elastic model for calculating minimum horizontal stress (S_{hmin}) that isolate some important considerations for interpreters. By exploring the elements of the model which contribute to the low-frequency component and the high-frequency component of the resulting S_{hmin} curve we interpret the role those fitting parameters such as the strain constants and the biot coefficient have in constructing these S_{hmin} estimates. Pitfalls of various choices of parametrization are highlighted.

References

Thiercelin, M.J., and R.A. Plumb. "A Core-Based Prediction of Lithologic Stress Contrasts in East Texas Formations." *SPE Form Eval* 9 (1994): 251–258. doi: <https://doi.org/10.2118/21847-PA>