



## The Biot Coefficient and Anisotropic Stress Estimation from Seismic

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### Summary

Knowledge about the formation pore pressure and anisotropic stress is very important for the wellbore stability and completion. We present an integrated approach for anisotropic stress estimation based on wireline well logs, piezometers and multicomponent seismic data.

The Biot coefficient (Biot and Willis, 1957), also known as the Biot-Willis coefficient ( $\alpha$ ), is the coefficient that multiplies formation pore pressure ( $P_p$ ) in equation (1)

$$\sigma_{ij \text{ effective}} = \sigma_{ij \text{ total}} - \alpha P_p \delta_{ij}, \quad (1)$$

where  $\sigma_{ij \text{ effective}}$  is the effective stress tensor,  $\sigma_{ij \text{ total}}$  is the total stress tensor, and  $\delta_{ij}$  is the tensorial form of Kronecker delta, which equals one if  $i=j$  and zero if  $i \neq j$ .

We will present how we estimated the Biot coefficient based on wireline logs and the impact on the seismic reconstruction of the in situ anisotropic stress field.

### Acknowledgements

Terra-IQ Ltd and Devon Canada Corporation

### References

Biot, M.A. and D. G. Willis, 1957, The elastic coefficients of the theory of consolidation: Journal of Applied Mechanics, **December**, 594-601.