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Numerical study of Annulus Thickness on Overcoring Stress Measurements

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ABSTRACT

Overcoring is a common technique to measure in situ rock stress using the concept of stress relief. The strains measured during overcoring are used to calculate the stress tensor assuming continuous, homogeneous, isotropic and linear elastic behaviour. This approach does not recognise any effect of the thickness of the rock annulus produced during overcoring instead assuming that the stresses are entirely a function of the difference in strain between the start of the overcoring and the end with no regard to the transient strains produced. Three-dimensional numerical modelling was used to simulate the overcoring process and investigate the impact of core diameter on the transient stresses and strains during overcoring. This study showed that in thicker core, maximum transient axial stresses and strains occur when the drill bit approaches the measuring point and greater tensile axial stresses were produced when the annulus was thinner.