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## Experimental Investigation on Borehole Breakout and Its Implication on Stress Magnitudes

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### **ABSTRACT**

Borehole breakout is a drilling induced phenomenon caused by overstress of rock around the borehole. Its depth usually aligns with the minimum horizontal principal stress direction. For this reason, it has been used to determine stress orientations and a series of researchers also argued its dimensions can be indicative of stress magnitudes. If the stress dependencies of breakout geometries are well understood, it is possible to estimate stress magnitudes based on these data. This paper investigates the influences of critical parameters on breakout dimensions, including absolute stress magnitudes, stress ratios and borehole diameter. Several experiments have been conducted on cubic (120 × 120 × 120 mm<sup>3</sup>) sandstone samples with pre-drilled holes (22 mm and 30 mm) under true tri-axial loading conditions using The University of New South Wales (UNSW) self-designed equipment. Experimental results confirm the increasing maximum horizontal principal stress magnitudes result in larger angular span and longer breakout depth at constant minimum horizontal and vertical principal stresses. There is also a considerable discrepancy observed between experimental results and the analytical model. Findings of this study imply a potential on the estimation of stress magnitudes using borehole breakout.