

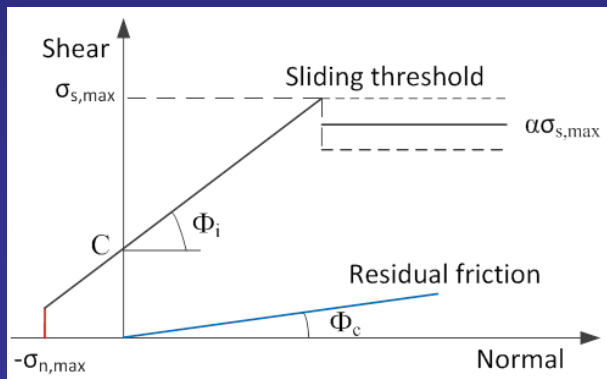
Systematic Investigation of the Planar Shape of Rock Fractures using PFC3D Numerical Experiments



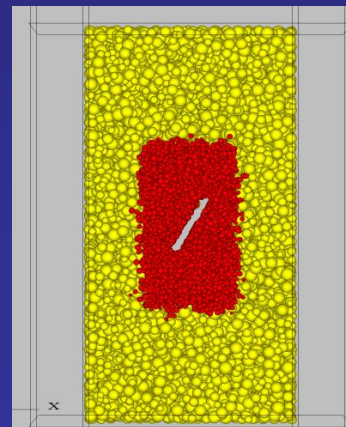
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It is important to know the planar shape of rock fractures when characterizing a fractured reservoir. The goal of this project is to investigate the fundamental mechanism of fracture propagation in rock and the factors affecting the planar shape of rock fractures, based on the numerical simulation with the three dimensional Particle Flow Code (PFC3D). The work includes (1) development and calibration of the numerical model using the experimental data including unconfined compressive strength, tensile strength and stress-strain curves; (2) validation of the calibrated numerical model by comparing the simulated fracturing pattern with the experimental fracturing results of the same rock; and (3) investigation of the planar shape of rock fractures and the different factors affecting the fracturing of rocks using the validated numerical model. So far several accomplishments have been achieved, including:

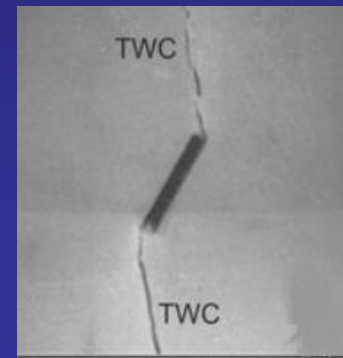
- A new contact model has been developed to better simulate rock fracturing process, and
- A unique “zoned” particle assembly with finer particle size around the initial fracture has been produced to simulate the cracking process of Carrara Marble.



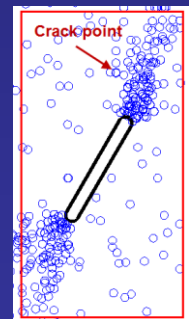
The modified strength criterion for the new contact model



Zoned PFC3D model to simulate Carrara marble



Cracking pattern of Carrara marble based on laboratory tests



Broken bond locations in PFC3D simulation