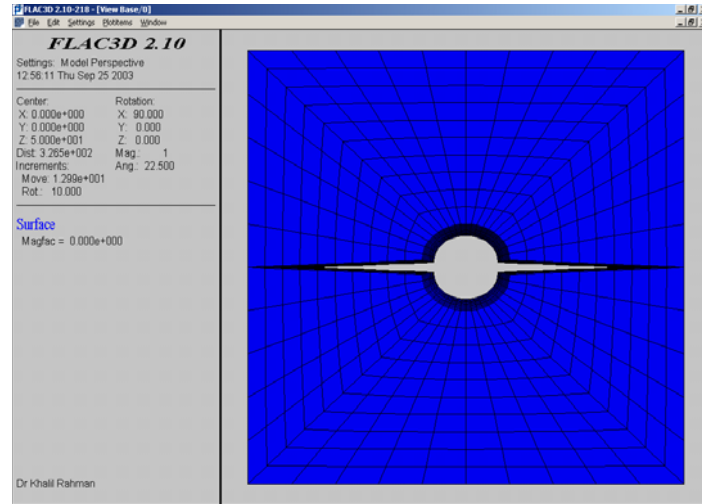
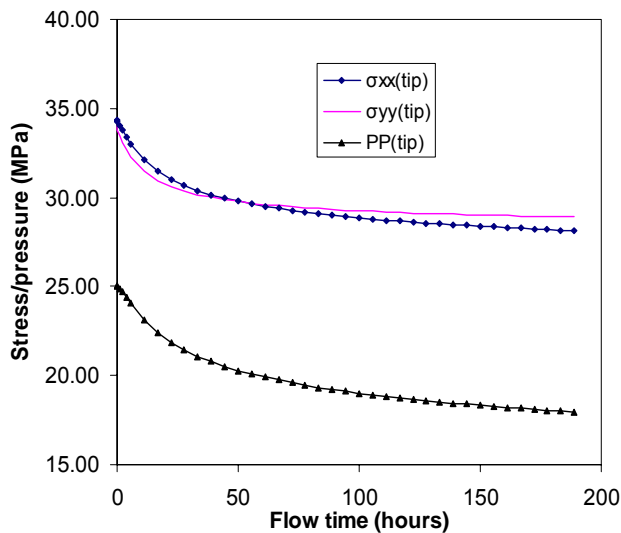


Multistage hydraulic fracturing

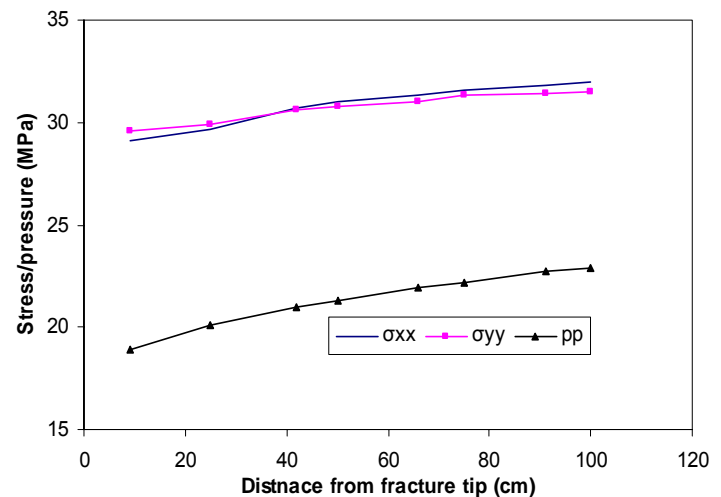
Like many regions in the world, most of Australian tight-gas reservoirs (Cooper Basin, Sydney Basin and part of Perth Basin) are subject to reverse faulting stress regimes. Hydraulic fracturing in these low-permeability reservoirs is instrumental to achieve economic production rates. The stress condition, however, influences the growth of the horizontal component of a fracture through a severely twisted configuration. This causes an extremely high pressure loss due to friction and thus requiring high pump capacity, proppant bridging in the constricted width and thus leading to premature screen-outs, and formation damage by multiple fracturing. These complexities have been found to be a major set back against realizing the potentially high productivity benefits from hydraulically fractured reservoirs in these regions. It is envisaged that these complexities can be minimised by carrying out the treatment in a number of stages at appropriate times when stress conditions will be benign due to production between stages. This project aims to investigate the time-dependent stress change in the reservoir as a function of production-induced reservoir pressure and to optimise the treatments for different stages by a complex, coupled numerical model.



Multistage fracture simulation by FLAC3D



Production-induced stress alteration for further fracture propagation in a small scaled reservoir.



The length for further fracture propagation without difficulty after 190 hours of production.

Publications Under Review:

- Rahman, M.K. and Joarder A.H., 'Modelling production-induced stress change at fracture tips: implications on multistage hydraulic fracturing', *Journal of Petroleum Science and Engineering*.
- Rahman, M.K., 'Coupled fluid flow and deformation modelling to characterize time-dependent stress distribution in petroleum reservoirs', *The International Journal of Geomechanics*.