Sustainable enhancement of CSG production in Queensland

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The aim of this project is to to design a suite of coal seam gas (CSG) reservoir stimulation techniques that combine hydraulic fracturing (HF) and microparticle injection, and develop the predictive modelling tools required to integrate these techniques into the CSG production workflow.

The work program will focus on computational modelling of phenomena that occur across a range of scales:

- The propagation of HFs and their interaction with natural fractures in complex and varying stress states.
- The development of the near-wellbore stress state and its influence on the coalescence of perforations.
- The transport of 'standard' proppant and microparticles in cleats and fractures subject to multiple phenomena.
- The definition of the stimulated reservoir volume and its productivity, along with uncertainty quantification.

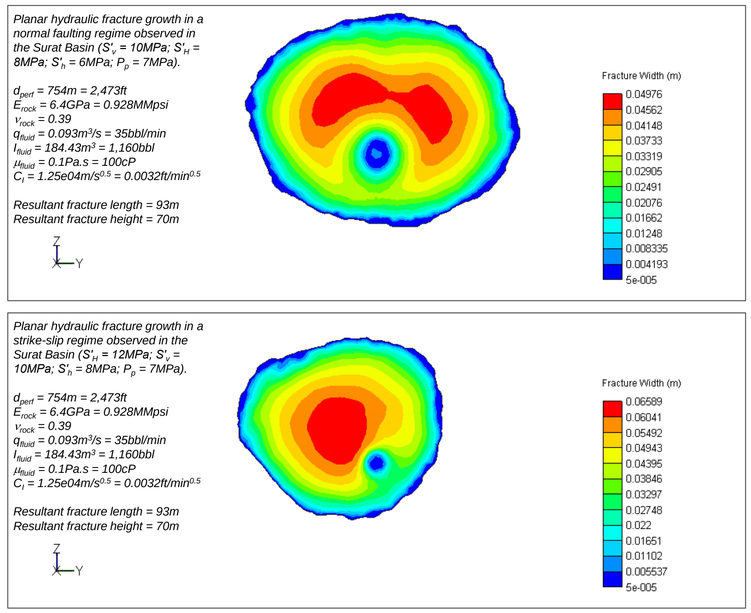


Figure 1: *FEM-DEM models of planar hydraulic fractures.*

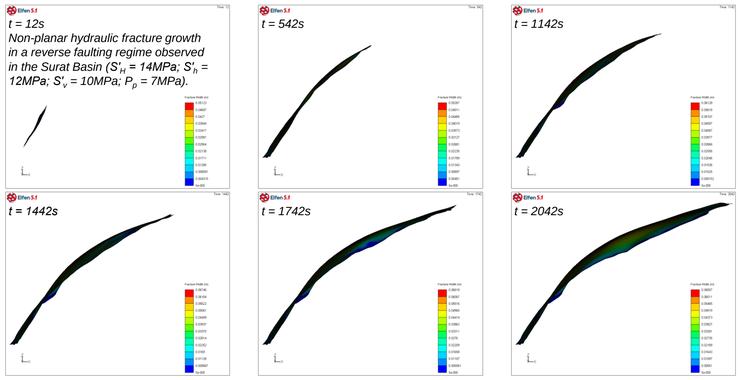


Figure 2: *Demonstrated turning of a hydraulic fracture from vertical to horizontal in a reverse faulting regime.*

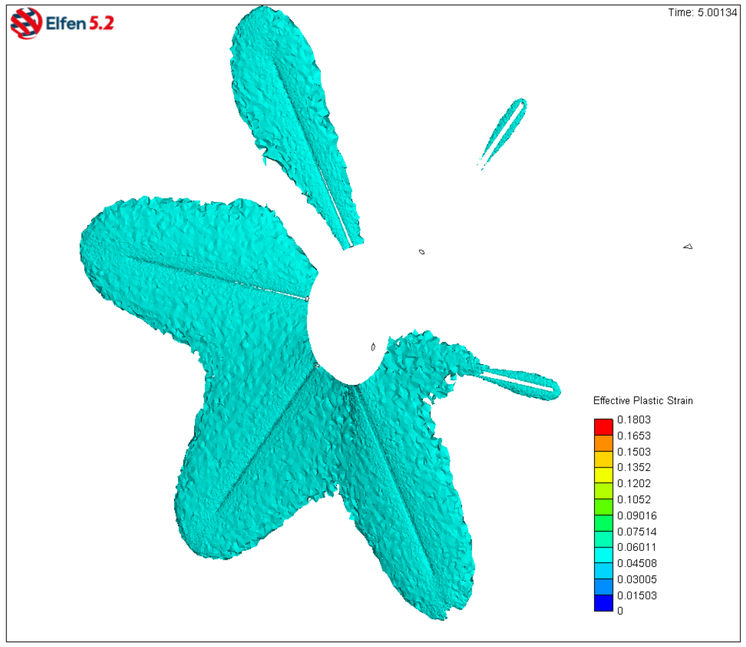
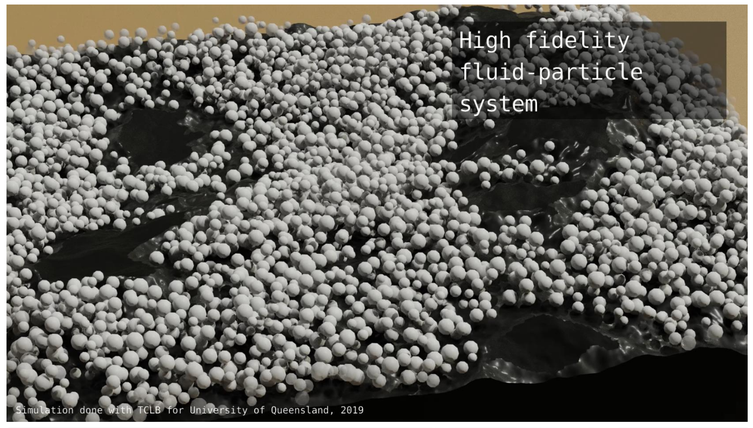


Figure 3: *Coalescence of fractures from injection into six perforations, as indicated by near-wellbore damage.*



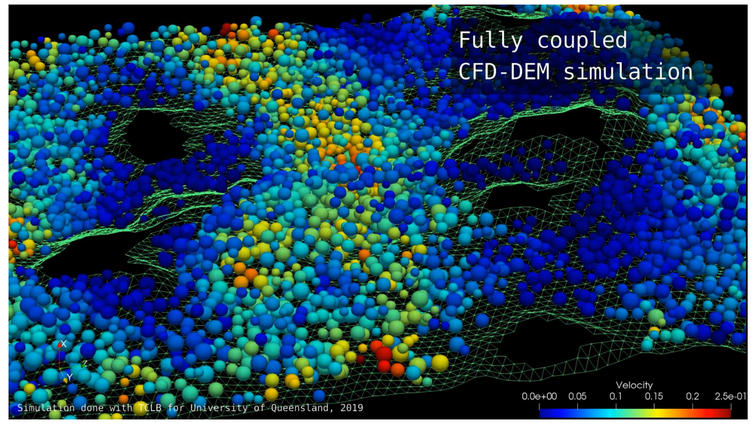


Figure 4: *Particle-scale modelling of proppant straining in coal fractures of varying width and connectivity.*

Looking forward, this project will amalgamate learnings related to fluid-particle transport, near-wellbore geomechanics, and far-field fracture propagation. The successful completion of this work will help liberate gas where current extraction technologies are too expensive or the coal is too tight to facilitate production.

Research with real world impact

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Acknowledgements

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