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A phase-field hydromechanical model of reservoir simulation

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Variational models of fracture and damage have become very popular, largely because of the versatility their numerical implementation through "phase-field".

In this talk, I will first describe the construction of a phase-field based coupled hydromechanical reservoir simulator. I will then revisit the problem of a single hydraulic fracture propagating in an infinite impermeable medium in order to justify our coupling strategy.

Finally, I will show how a phase-field description of a system of cracks can be leveraged to model flow in a fractured porous medium. I will describe the coupling of the flow and mechanics problems, and illustrate the properties of this model through various numerical simulations.

Short CV:

Dr. Yoshioka joined UFZ in October 2017 to work on computation of fracturing induced by hydraulic and thermal impacts undertaken in subsurface. He received his Bachelor of Science in Resources and Environmental Engineering from Waseda University at Tokyo, Japan in 2003 and PhD in Petroleum Engineering from Texas A&M University at College Station, USA in 2007. From 2007 to 2017, Dr. Yoshioka worked for Chevron at their technology center in Houston conducting internal consulting and corporate R&D on various geomechanical problems including a short assignment to Chevron Geothermal in Jakarta, Indonesia in 2008.