Zhiqiang Fan is a Redfield fellow in the Division of Hydrological sciences. His research combines fault and fracture mechanics and thermal-hydro-mechanical coupling addressing deformation and failure mechanisms of fluid-saturated rocks, and structural control of mass and heat transfer in sedimentary basins. His research is of applied interest to groundwater management, hydrocarbon production, and enhanced geothermal system development.

Area of Expertise

- Fault and Fracture mechanics
- Poroelasticity
- Elastic-plastic analysis of rocks with applications to borehole stability
- Thermo-Hydro-Mechanical (THM) couplings in porous media
- Induced seismicity
- Hydraulic facturing
- Porous flow and fracture flow
- Modeling of fluid-driven fracture propagation (XFEM, Cohesive zone)
- Micromechanics of composite
- Large deformation of hyperelastic materials

Selected recent peer-reviewed publications

- **Fan, Z**., Eichhubl, P., & Newell, P. (2019). Basement fault reactivation by fluid injection into sedimentary reservoirs: Poroelastic effects. Journal of Geophysical Research: Solid Earth, 124, 7354-7369, https://doi.org/10.1029/2018JB017062.

- **Fan, Z.,** & Parashar, R (2019) Poroelastic effect on transient flow to a finite-radius well with wellbore storage and skin effect in a confined aquifer. Advances in Water Resources, under review

- **Fan, Z**., Parashar, R., & Z-H Jin (2019). Impact of Convective Cooling on Pore Pressure and Stresses around a Borehole Subjected to a Constant Flux: Implications for Hydraulic Tests in an EGS Reservoir. Interpretation, in revision.

- **Fan Z** & Parashar, R (2019) Analytical Solutions for a Wellbore Subjected to a Non-isothermal Fluid Flux: Implications for Optimizing Injection Rates, Fracture Reactivation, and EGS Hydraulic Stimulation. Rock Mechanics and Rock Engineering, 52, 4715-4729, https://doi.org/10.1007/s00603-019-01867-9.

- **Fan, Z**., P. Eichhubl, and J. F. W. Gale (2016), Geomechanical analysis of fluid injection and seismic fault slip for the M_w4.8 Timpson, Texas, earthquake sequence, Journal of

geophysical research. Solid earth, 121, 2798–2812, https://doi.org/10.1002/2016JB012821.

- **Fan, Z.Q.**, Jin, Z.-H., Johnson, S. E., (2014), Oil-gas transformation induced subcritical crack propagation and coalescence in petroleum source rocks. International Journal of Fracture, 185, 187-194, https://doi.org/10.1007/s10704-013-9901-9.
- **Fan, Z.Q.**, Jin, Z.-H., Johnson, S. E., (2012), Modeling petroleum migration through microcrack propagation in transversely isotropic source rocks, Geophysical Journal International,190,179-187, https://doi.org/10.1111/j.1365-246X.2012.05516.x.
- **Fan, Z.Q.**, Jin, Z.-H., Johnson, S. E., (2012), Gas-driven subcritical crack propagation during the conversion of oil to gas, Petroleum Geoscience, 18,191-199, https://doi.org/10.1144/1354-079311-030.
- **Fan, Z.Q.**, Jin, Z.-H., Johnson, S. E., (2010), Subcritical propagation of an oil-filled penny-shaped crack during kerogen-oil conversion, Geophysical Journal International, 182, 1141-1147, https://doi.org/10.1111/j.1365-246X.2010.04689.x.
- Jin, Z.-H., Johnson, S.E. & **Fan, Z.Q.** (2010), Subcritical propagation and coalescence of oil-filled cracks: getting the oil out of low-permeability source rocks, Geophysical. Research. Letters, 37, L01305. https://doi.org/10.1029/2009GL041576.
- **Fan, Z.** &Parashar, R. (2018). Effect of Coupled Porothermoelastic Stress on Shear Stimulation of Enhanced Geothermal Systems, 43rd Workshop on Geothermal Reservoir Engineering, Stanford University, Stanford, California, February 12-14, 2018, 11p. https://pangea.stanford.edu/ERE/pdf/IGAstandard/SGW/2018/Fan.pdf
- Zhu C, **Fan, Z**., and P. Eichhubl (2017). The effect of variable injection rate on the stability of seismogenic faults, 51st US Rock Mechanics/Geomechanics Symposium, ARMA 17-98, https://www.onepetro.org/conference-paper/ARMA-2017-0098.
- **Fan, Z. Q.**, Jin, Z.-H. & Johnson, S. E. (2013). Microcrack propagation and coalescence induced by the oil-gas transformation. 13th International Conference on Fracture, June 16-21, 2013, Beijing, China, 9p. http://www.gruppofrattura.it/ocs/index.php/ICF/icf13/paper/viewFile/11279/10658