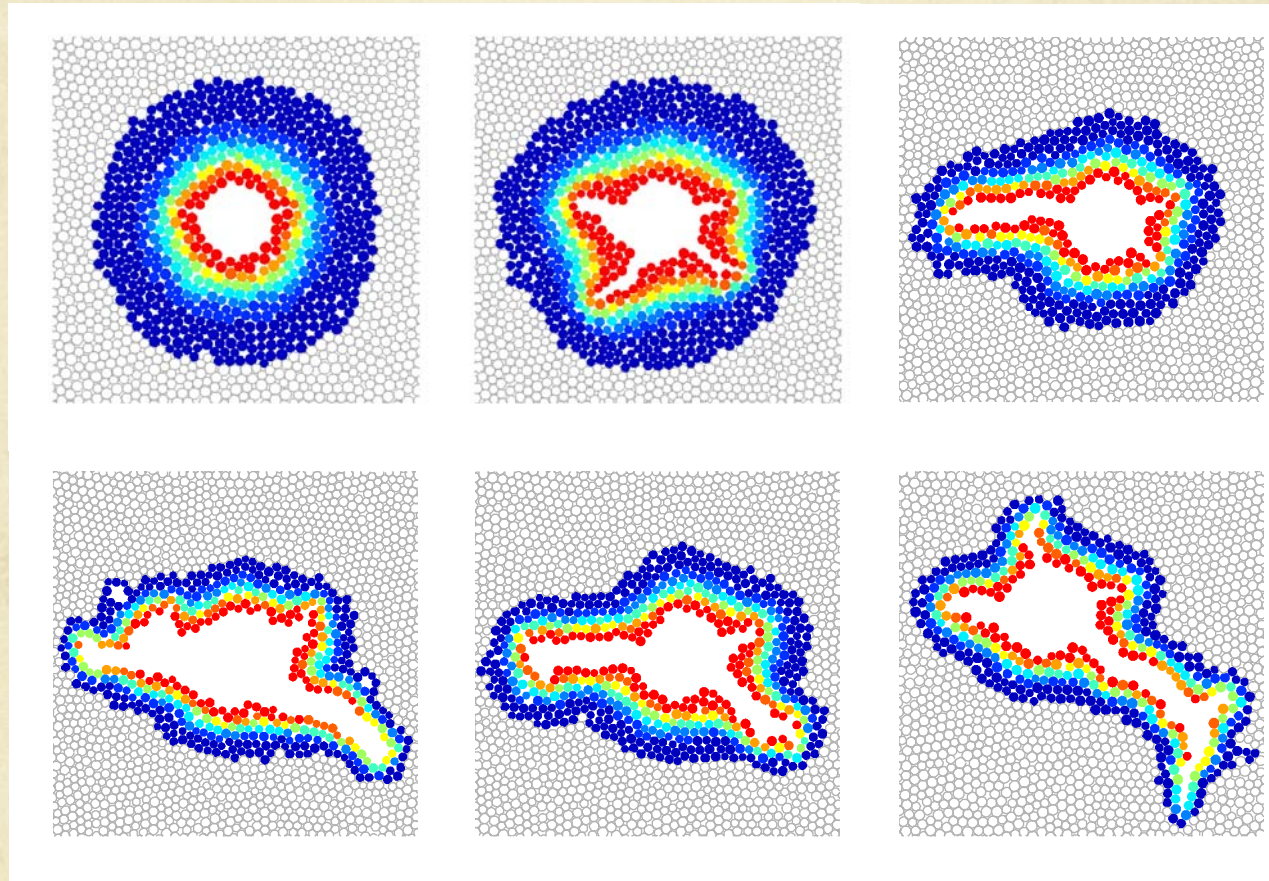


# Pattern Formation in Fluid Injection into Granular Media: *Transition from Viscous Fingering to Hydraulic Fracturing*

Haiying Huang, School of Civil and Environmental Engineering  
Georgia Institute of Technology



Numerical simulations of fluid injection from a circular wellbore using the discrete element method coupled with a porescale network model, showing the effect of inject rate on the grain displacement and infiltration patterns (injection rate increases from left to right and from top to bottom ; colors are associated with the pore pressure magnitude).