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The Effect of Brownian Motion of Nano-Catalysts on the Stability of Reactive Fronts in Porous Media KARIM GHESMAT, HASSAN HASSANZADEH, JALAL ABEDI, JOHN CHEN, Department of Chemical Engineering, University of Calgary — The reactive flows in porous media that involve the displacement of fluids by different physical properties may lead to a hydrodynamic instability. The use of nano-particles as catalysts in porous media has recently been increased and is generally relevant to applications that include *in-situ* heavy oil upgrading and removal of reactive and non-reactive pollutants in groundwater. The objective is to investigate the effects of *nano-catalysts* and *chemical reactions* on this instability. In order to understand the physics of this flow displacement, the basic equations of conservation of mass and momentum are linearized and solved numerically for a homogenous porous medium. The analysis reveals that increasing the reaction rate enhances the instability around an interface including nano-catalysts while increasing the nano-catalysts deposition rate in porous media usually stabilizes the front. The effects of the interface sharpness, nano-particle diffusion coefficient, permeability of porous media, and viscosity ratios of different phases will also be discussed.

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