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Behaviours of two-phase flow in a single pore with varying temperature

Abstract:

For a saturated compositional fluid flowing through a porous medium, a gas phase can appear and disappear. This phenomenon is affected by flow rate, pressure, and temperature. By analyzing a 2×2 dynamical system, a previous study investigated the Relationship between the aforementioned phenomenon and the injected flow rate at fixed temperature and pressure.
In this talk, we explore the appearing and disappearing phenomenon at various temperatures and initial bubble sizes. Our results indicate that for a fixed outlet pressure and injection flow rate, whether the gas phase behavior is steady-state or cyclic depends on the ratio between inlet and outlet channel radii, as well as temperature. Our computations demonstrate that, at a fixed temperature, the gas phase transitions from a steady state to an unstable spiral state as the ratio of the inlet and outlet channel radii decreases. The steady state features of bubble size, gas phase pressure and liquid pressure depend on the temperature; the bubble size increases while the gas and liquid pressure decrease as the temperature increases.

Biography

K. Alex Chang grew up in Taiwan and received his Bachelor's degree from the National Central University in 1980. He received his Ph.D. degree from the department of Applied Mathematics and Statistics at the Stony Brook University. He did his Post-Doc at Indiana University, Bloomington, USA. He joined the department of Applied Mathematics, National Pingtung University in 1998. His research interests are Numerical Analysis, Numerical PDE, Compositional flows in porous media, and two-phase flow with phase equilibrium.