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Enhancement of particle-induced viscous fingering in bidisperse suspensions FENG XU, Texas A&M University, SUNGYON LEE, University of Minnesota — The novel particle-induced fingering instability is observed when bidisperse particle suspensions displace air in a Hele-Shaw cell. Leading to the instability, we observe that larger particles consistently enrich the fluid-fluid interface at a faster rate than the small particles. This size-dependent enrichment of the interface leads to an earlier onset of the fingering instability for bidisperse suspensions, compared to their monodisperse counterpart. Careful experiments are carried out by either systematically varying the ratio of large to small particles at fixed total concentrations, or by changing the total concentrations while the large particle concentrations are held constant. Experimental results show that the presence of large particle causes the instability to occur at concentrations as much as 5% lower than the pure small particle case. We also discuss the physical mechanism that drives the enrichment and the subsequent instability based on the modified suspension balance model.

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