

Removal of yield stress fluids from rectangular channels

Ali Eslami

Department of Chemical Engineering, Université Laval, Quebec, QC, Canada
Ali.Eslami.1@ulaval.ca

Seyed Mohammad Taghavi

Department of Chemical Engineering, Université Laval, Quebec, QC, Canada
Seyed-Mohammad.Taghavi@gch.ulaval.ca

We study experimentally a two-phase interfacial flow wherein air pushes into a yield stress fluid in long, uniform horizontal channels of various rectangular cross sections. Compared to traditional narrow channel cases (i.e., Hele-Shaw cells), the gap thickness in our rectangular channels is increased slightly to consider the effects of the cross-section aspect ratio and buoyancy, on the removal of the yield stress fluid and the induced flow patterns. We show that the yield stress together with buoyancy effects influence the flow patterns. Here, in particular, we find that *branched fingering patterns*, reported in the literature for negligible buoyancy effects, are not formed. Finally, we analyze the flow using the dimensionless air finger width, as a measure of removal efficiency, for various aspect ratios and buoyancy effects, and provide a comprehensive flow regime map.