

Abstract Submitted
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Buoyant displacement flows of miscible fluids in axially rotating pipes¹ SEYED MOHAMMAD TAGHAVI, SHAN LYU, Universit Laval — This work experimentally considers the effects of a pipe axial rotating motion on buoyant displacement flows of miscible fluids in an inclined pipe. A heavy Newtonian fluid displaces a light Newtonian or yield stress fluid. The experiments are performed in a long transparent pipe so that the displacement flow patterns can be visualized using high speed imaging techniques. The analysis of our experimental results reveals that the displacement process can be affected by variations of the experimental parameters, such as the pipe inclination angle, the density difference, and most importantly the pipe rotation speed. For both Newtonian and yield stress displacements, increasing the pipe rotation speed enhances the transverse mixing between the fluids and, above a critical transition, leads to a complete removal of the displaced fluid. The results are quantitatively analyzed using the flow dimensionless groups, such as the Rossby number, the Froude number, and the Bingham number.

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