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Motion of Non-Newtonian liquid plugs in channels[1] PARSA ZAMANKHAN, University of Michigan - Department of Biomedical-Engineering, BRIAN HELENBROOK, Department of Mechanical and Aeronautical Engineering, Clarkson University, SUICHI TAKAYAMA, JAMES GROTBERG, University of Michigan - Department of Biomedical-Engineering — Some major transport phenomena in the human respiratory system such as the reopening of the occlude airways and drug delivery involve with propagation of liquid plugs, constituted from non-Newtonian fluids. In this presentation the transport of liquid plugs, constituted from the yield stress Bingham, and shear thinning power-law fluids is investigated numerically. The governing equations are solved by a mixed-discontinuous finite element formulation while the free surface is resolved by the method of spines. The constitutive equation for Bingham fluid is implemented through a regularization method. The effects of the yield stress and the power-law index on the flow feature are compared and discussed. Special attention is given to the distribution of the stresses along the wall with applications in cell injury studies.

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