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ANALITICAL AND NUMERICAL SOLUTIONS OF A COUETTE POISEUILLE FLOW OF A COMPLEX KINETIC LIQUID

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In this work, the Couette-Poisuille flow of a complex kinetic liquid flowing between two parallel plates in the cases when the upper plate moves at a constant velocity, and the lower one is at rest. The flow is analyzed using the Bautista-Manero-Puig (BMP) constitutive equation, consisting on the Upper-Convected Maxwell equation coupled to a kinetic equation to account for the breakdown and reformation of the fluid structure. Analytical solutions for the axial velocity and for the volumetric flow are found. The influence of the structural, kinetics, and viscoelastic properties is analyzed. When the rupture time is equal to the viscoelastic Maxwell time, the thixotropic effects are analyzed. Finally, axial velocity and flow enhancement is predicted using experimental data reported elsewhere for wormlike micellar solutions of cetyl trimethyl ammonium tosilate (CTAT) [1-2]

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EFFECT OF RANDOM LONGITUDINAL VIBRATIONS ON THE POISEUILLE FLOW OF A COMPLEX LIQUID

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In this work, the rectilinear Poiseuille flow of a complex liquid flowing in a vibrating pipe is analyzed. The pipe wall performs oscillations of small amplitude that can be adequately represented by a weak stochastic process, for which a quasi-static perturbation solution scheme is suggested. The flow is analyzed with the Bautista-Manero-Puig model (BMP) constitutive equation, consisting in the Upper Convected Maxwell equation coupled to a kinetic equation to account for the breakdown and reformation of the fluid structure. A drastic enhancement of the volumetric flow is predicted in the region where the fluid experiences pronounced shear-thinning. Finally, flow enhancement is predicted using experimental data reported elsewhere for worm-like micellar solutions of cetyl trimethyl ammonium tosilate (CTAT) at different concentrations [1-3].