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Effective Slip for An Upper Convected Maxwell Fluid

We consider an upper convected Maxwell fluid with solvent and diffusion undergoing shear flow at a solid wall. We show that even for this simple model, stress diffusion may lead to plug flow and sharp boundary layers near the solid wall. We discuss this for a simple channel flow configuration and generalize the results to lubrication models of a thin film flowing over a solid substrate. For this free boundary problem a distinguished limit can be identified. The lubrication models are found to correspond in part to previously known lubrication models with a slip boundary condition.

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