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Effect of Elasticity on Stability of Viscoelastic Liquid Curtain¹ ALIREZA MOHAMMAD KARIM, WIESLAW SUSZYNSKI, LORRAINE FRAN-CIS, University of Minnesota, Twin Cities, MARCIO CARVALHO, Pontifcia Universidade Catlica do Rio de Janeiro, UNIVERSITY OF MINNESOTA, TWIN CITIES COLLABORATION, PONTIFCIA UNIVERSIDADE CATLICA DO RIO DE JANEIRO COLLABORATION, DOW CHEMICAL COMPANY COLLABO-RATION — Curtain coating is one the preferred methods for high-speed precision application of single-layer and multi-layer coatings in industry. Despite the extensive variety of applications of curtain coating, its operation is challenging and uniform coating is only obtained in a certain range of operating parameters, called the coating window. The two main physical mechanisms that limit curtain coating are the breakup of the liquid curtain, below a critical flow rate, and the catastrophic event of air entrainment, which occurs above a certain web speed. The rheological characteristics of the coating liquid play an important role on these mechanisms, but the fundamental understanding of the role of rheology is still not complete. In this work, we analyze the relative importance of shear and extensional viscosity on both curtain breakup and dynamic contact line instability (i.e. air entrainment). Aqueous solutions of polyethylene oxide (PEO) and polyethylene glycol (PEG) of different molecular weights were used as model liquids to obtain fluids with different levels of extensional thickening behavior.

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Alireza Mohammad Karim University of Minnesota, Twin Cities

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