

New Perspectives on Large Amplitude Oscillatory Shear Rheology



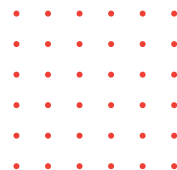
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Large Amplitude Oscillatory Shear flows (LAOS) provide a versatile and reproducible means of measuring a material's response to unsteady and nonlinear flow conditions, which are typical of real processing conditions. But interpreting LAOS measurements remains a challenge, and foundational assumptions – such as a linear velocity field – may not even be correct. In this talk, we will investigate the linear response function of LAOS flows for highly entangled and shear thinning polymer melts, and build connections to disparate fields including quantum mechanics and process controls. The first part of the talk will focus on developing a new experimental and mathematical analysis framework for parallel superposition rheology in LAOS, uncovering a general stability criterion for shear banding instabilities. The second part of the talk extends the discussion to two dimensional flows, following the linear stability of Kelvin waves and the subsequent nonlinear dynamics in two dimensional LAOS flows.