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Nanorheology of confined polymer films PAUL FOWLER, MARK ILTON, Department of Physics Astronomy and the Brockhouse Institute for Materials Research, McMaster University, Hamilton, ON, Canada, JOSHUA D. MCGRAW, Dpartement de Physique, Ecole Normale Suprieure / PSL Research University, CNRS, 24 rue Lhomond, 75005 Paris, France, KARI DALNOKI-VERESS, Department of Physics Astronomy and the Brockhouse Institute for Materials Research, McMaster University, Hamilton, ON, Canada — Liquid films with a non-uniform thickness flatten in order minimize surface energy, a process driven by surface tension and mediated by viscosity. For a viscous thin film, the time evolution of the film height profile is accurately described with lubrication theory by the capillary-driven thin film equation. Previous experiments have successfully applied the thin film equation to measure the rheological properties of polymeric liquids. Here we probe confinement effects in thin polymer films. We measure the viscosity by tracking the levelling of surface perturbations with AFM. For films with thicknesses thinner than the end-to-end distance of the molecule we observe deviations from a thin film model with bulk viscosity.

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