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Confinement Effects with Films of Nonlinear Polystyrene MARK FOSTER, QIMING HE, The University of Akron, SURESH NARAYANAN, Argonne National Laboratory, DAVID WU, Colorado School of Mines — The surface fluctuations of annealed melt films of 6k cyclic polystyrene (CPS), its linear analog, and a long-branched chain were measured using X-ray photon correlation spectroscopy (XPCS) for films of various thicknesses. The surface fluctuations of the 6k linear PS melt films 17 nm and thicker and the 6k cyclic melt films 28 nm and thicker can be described using a hydrodynamic continuum theory (HCT) that assumes the film is characterized only by the bulk viscosity. When a film of CPS is 24 nm or thinner, the behavior can no longer be captured using the HCT with bulk viscosity. The surface fluctuations behave as though the film has an effective viscosity higher than the bulk value. The thickness at which confinement effects are seen for the 6k CPS chains is larger than that for the linear analogs. Confinement effects for long-branched chains appear at even larger thicknesses relative to R_g. Acknowledgements: Use of the Advanced Photon Source at Argonne National Laboratory was supported by the DOE's Office of Science under Contract DE-AC02-06-CH11357. This work was supported by NSF Grants CBET-0730692 and CBET-0731319.

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