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Van der Waals model for phase transitions in thermoresponsive surface films JOHN MCCOY, New Mexico Tech, JOHN CURRO, University of New Mexico — Phase transitions in polymeric surface films are studied with a simple model based on the van der Waals equation of state. Each chain is modeled by a single bead attached to the surface by an entropic-Hooke's law spring. The surface coverage is controlled by adjusting the chemical potential, and the equilibrium density profile is calculated with density functional theory. The interesting feature of this model is the multivalued nature of the density profile seen at low temperature. This van der Waals loop behavior is resolved with a Maxwell construction between a high-density phase near the wall and a low-density phase in a "vertical" phase transition. Signatures of the phase transition in experimentally measurable quantities are then found. Numerical calculations are presented for isotherms of surface pressure, for the Poisson ratio, and for the swelling ratio.

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