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Particle-Size Dependency of Single Molecule Properties in Surface-Tethered Particle Systems by Monte Carlo Simulation IAN HAMILTON, MARC ROBERT, Rice University — We consider the behavior of a surface-tethered particle system, comprising a single colloid particle tethered to a flat surface by a single polymer chain. This study is relevant to the interpretation of tethered particle motion experiments, wherein the motion and position of the tethered particle are used as reporters on the conformational properties of the underlying polymer molecule. The dependency of the polymer dimensions on the relative size of the tethered particle at equilibrium is obtained by Monte Carlo simulations with both random walk and self-avoiding walk polymer models. Two local maxima are found in the expansion factors of the polymer tether as a function of particle size, with both models. Comparison of these two models shows that the particle-size effects are separable from expansion by self-excluded volume of the polymer. Furthermore, the non-monotonic behavior persists to very large particle sizes before the expected asymptotic gparallel plate h limit is reached. The maxima are revealed to be due to the rotational entropy of the junction between the polymer and particle.

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