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Statistical and dynamical properties of a vibrated granular polymer ARSHAD KUDROLLI, MICAH VEILLEUX, Physics Dept., Clark University, MEHRAN KARDAR, Physics Dept., MIT — We investigate the structure and dynamics of granular polymers on a vibrated bed to test the applicability of models of self-avoiding random walks. The granular polymer is composed of a chain of hollow 3 mm steel beads connected by flexible links, and moves on a 30 cm diameter flat circular bed which is roughened by gluing a layer of 1 mm steel beads in order to give the chain random kicks in the vertical and horizontal directions. High speed digital imaging is used to track the position of the particles to a fraction of the bead diameter using a centroid technique. Using the identified bead positions, we analyze the motion of the center of mass over a time interval Δt, and its standard deviation as a function of chain length L. The standard deviation is consistent with a scaling of $\sqrt{\Delta t/L}$. The chain end-to-end distance scales as L^{ν}, with $\nu \approx 3/4$ as for self-avoiding walks. The evolution of the scattering functions and the effect of the size of the container on the observed scaling will be also discussed.

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