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Topological effects on the mechanical properties of polymer knots

Yani Zhao, Franco Ferrari

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- 1) The manuscript presents the first study of stretching of knotted polymer rings using the Wang-Landau algorithm. Extensive calculations have been performed computing several observables for a large set of knots encompassing almost all knots up to seven minimal crossings according to the Rolfsen table.
- 2) The phase diagram of short knotted polymer rings up to lengths of 120 segments on a simple cubic lattice is determined.
- 3) Findings that can be tested experimentally are the determination of the theta point for the trefoil knot and the discovery of another special point in which the specific energies of knots of the same topological type but different lengths coincide.
- 4) Another interesting feature that has been found is that, at very low temperatures, the force-elongation curves of all investigated knots are characterized by jumps and plateaus that disappear when the reduced temperature $T > 0.4$.

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