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Monte Carlo Explorations of Polygonal Knot Spaces

Polygonal knot spaces are the smooth manifolds of embeddings of n-sided polygons in three-space. Specific spaces may be required to respect additional structure such as the number or length of edges, bounds on the angles between adjacent edges, bounds on the distance between non-adjacent edges, etc. Monte Carlo methods, random selection of vertices, and pivot transformations of embeddings have been used to give estimates of bounds on knot types (as reflected by HOMFLY polynomial invariants) and to seek optimal conformations such as minimal energy, maximal thickness or length, or other related "physical" quantities. The current status of these Monte Carlo explorations will be discussed.