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Knotting statistics after a local strand passage in self-avoiding polygons on $\mathbb{Z}^3$.

On the macroscopic scale, circular DNA can be viewed simply as a ring polymer. Experimental studies of enzyme action on DNA have inspired investigation of the following question about polygon models of ring polymers: Given a polygon with a fixed knot type, how does the distribution of knots after a "local" strand passage depend on the polygon's initial knot type, its length and on the specific details of the strand passage such as where it occurs and the number of edges altered in the strand passage? In 2000 Szafron proposed the first self-avoiding polygon (SAP) lattice model for investigating this. In the model, a SAP is used to model a ring polymer in dilute solution for which it is assumed that two segments of the polymer have already been brought close together to enable a local strand passage. Such a SAP, called a Θ-SAP, contains a specific pattern Θ at the strand passage site. Recent results obtained with Dr. M. Szafron about this model will be presented. In particular, numerical evidence that the after-strand-passage knot probabilities depend on the structure around the strand passage site will be provided. These results are consistent with the findings of Liu *et al* (2006-2010) for another polygon model of local strand passage. (Received February 16, 2010)