Meeting: 1004, Bowling Green, Kentucky, SS 4A, Special Session on Knot Theory and Its Applications

1004-62-177 **M L Szafron*** (szafron@math.usask.ca), 106 Wiggins Road, Saskatoon, SK S7N5E6, Canada, and **C E Soteros** (soteros@math.usask.ca), 106 Wiggins Road, Saskatoon, SK S7N5E6, Canada. *The Probability of Knotting after a Local Strand Passage in SAPs.* Preliminary report.

Due to DNA's structure, it is prone to several topological entanglement problems. For example, knotted DNA cannot replicate successfully. The cell needs to have some mechanism by which it can solve this problem with replication.

The mechanism is an interaction between the DNA and the topoisomerase enzymes. The topoisomerase interact locally with the DNA and pass one strand of DNA through itself via the enzyme-bridged transient break in the DNA. Since these local strand-passages can potentially change the knot-type of the DNA, experimentalists can use the frequency of knots produced to characterize topoisomerase action on DNA topology.

For comparison to DNA experiments, it would be useful to know the expected knot probabilities when local strand-passages are implemented at random locations in a ring polymer. In order to investigate this problem, a simplified model of a ring polymer was implemented via Monte Carlo simulation to estimate the probability that the ring polymer had knot-type K after a local strand passage had occurred within the ring polymer. The model, some knotting probability estimates, and a comparison with the estimated knotting probabilities of Stasiak et al will be presented. (Received January 24, 2005)