1033-92-161 **Mariel Vazquez*** (mariel@math.sfsu.edu), San Francisco State University, Mathematics Department, 1600 Holloway Ave, San Francisco, CA 94132. *Modelling DNA unknotting by Type II Topoisomerases.* Preliminary report.

DNA knots and links affect crucial cellular processes such as DNA replication, transcription regulation, chromatin modification and cell division. Type II topoisomerases simplify DNA knots and links efficiently by performing strand-passage on DNA strands. Experimental studies have shown that these enzymes simplify the topology of DNA below thermodynamical equilibrium, however the key behind their efficiency is yet to be revealed. Motivated by these experimental observations, we study random transitions of knotted polygonal chains of fixed length. We use the BFACF algorithm to sample an ensemble of polygons of a fixed knot type in Z^3. We perform random strand-passage on the polygons using a novel algorithm that operates at the Dowker-Thistlethwaite code level. Topological biases are introduced at the strand-passage step and one-step transition probabilities and steady state distributions are obtained. Finally we explore the effect of the solution's ionic strength on the steady state distributions. This is joint work with Xia Hua, Nathan Shayefar, Itamar Landau, Reuben Brascher, and Juliet Portillo. The project is funded by an NIH MBRS SCORE grant to MV (S06 GM052588). (Received September 10, 2007)