1058-82-213 **Marc L. Mansfield*** (marc.mansfield@stevens.edu), Dept. of Chemistry, Stevens Institute of Technology, Hoboken, NJ 07030. *Transport properties of knotted polymers and DNA.*

There has been interest in predicting the transport properties of knotted polymers ever since it was first observed that the electrophoretic mobility of DNA corrrelates with knot complexity. Many of these calculations have been based on dilute-solution hydrodynamic theory, which is most likely inadequate for gel electrophoresis. Nevertheless, we have computed transport properties of knotted ring polymers by a relatively new, versatile path-integration technique that is capable of determining dilute-solution properties even of bodies of complex shape. Although our results are consistent with the existence of asymptotic scaling laws, we find that mass-scaling for the transport properties fails at all accessible molecular weights. Interestingly, knotted polymers and DNA at accessible molecular weights appear to be in a "double-crossover." One crossover is attributed to knot localization, which does not develop fully until the chains are very long. The other is the "draining" crossover, or the very slow convergence of hydrodynamic properties to their asymptotic behavior. In particular, we find that stiff chains, such as DNA, exhibit an exceptionally strong draining effect. (Received February 15, 2010)