Meeting: 1002, Pittsburgh, Pennsylvania, SS 7A, Special Session on Knots and Macromolecules

1002-82-169 **Nathan T. Moore**, MN, and **Rhonald C. Lua** and **Alexander Y. Grosberg*** (grosberg@physics.umn.edu), Department of Physics, University of Minnesota, 116 Church Street SE, Minneapolis, MN 55455. *On the analogy between trivial knots and self-avoiding walks.*

Consider loops in $3D$, each loop consists of N segments length ℓ each, and let $\langle R_g^2 \rangle_0$ be the loop gyration radius squared and averaged over all loops with the topology of a trivial knot. It has been shown theoretically on a scaling level that $\langle R_g^2 \rangle_0$ scales as $\ell^2 N^{2\nu}$ asymptotically at large $N \gg 1$, where ν is the critical exponent associated with self-avoiding walks. This was also confirmed by computaional studies. In order to look deeper at the connection between trivial knots and self-avoiding walks, we performed computational study of relatively short loops, where more rigorous loop generation algorithms are available, where topological invariants used to discriminate knots are more reliable, and where we expect to test the relation between $\langle R_g^2 \rangle_0$ and similar quantity for self-avoiding walks in the region in which perturbative rather than scaling asymptotics is valid at least for the self-avoiding walk. Our preliminary results suggest that trivial knots and self-avoiding walks have different statistics in this region, thus indicating fundamental difference between the two. (Received September 13, 2004)