1058-57-187 **Kenneth C. Millett** and **Eric J. Rawdon*** (ejrawdon@stthomas.edu), Department of Mathematics, University of Saint Thomas, 2115 Summit Ave, Saint Paul, MN 55105, and **Andrzej Stasiak** and **Vy Tran**. *Symmetry-breaking in cumulative measures of shapes of polymer models.* Preliminary report.

Using numerical simulations we investigate shapes of random polygons, one of the simplest models of freely fluctuating circular polymers in a solution. We are interested in the 3D density distribution of our modeled polymers where the polymers have been aligned with respect to their three principal axes of inertia. This type of approach was pioneered by Theodorou and Suter in 1985. The approach of Theodorou and Suter results in a shape which is symmetric with respect to the xy, xz, and yz planes. This high order of symmetry is somewhat troubling as it is maintained even for chiral sets of data. By taking advantage of asymmetries within the modeled polymers, we modify the procedure of aligning independent configurations in such a way that shows their asymmetry. This approach reveals, for example, that the 3D density distribution for left-handed trefoil knots has a chiral structure that is mirror symmetric to the equivalent 3D density distribution obtained for right-handed trefoil knots. The symmetry breaking approach reveals more information than the traditional, symmetrical 3D density distributions originally introduced by Theodorou and Suter. (Received February 15, 2010)