Random walks and polygons in tight confinement

Y. Diao, C. Ernst and U. Ziegler

Preprint no. 2013-14

Abstract

We discuss the effect of confinement on the topology and geometry of tightly confined random walks and polygons. Here the walks and polygons are confined in a sphere of radius $R \geq 1/2$ and the polygons are equilateral with n edges of unit length. We illustrate numerically that for a fixed length of random polygons the knotting probability increases to one as the radius decreases to $1/2$. We also demonstrate that for random polygons (walks) the curvature increases to πn ($\pi(n-1)$) as the radius approaches $1/2$ and that the torsion decreases to $\approx \pi n/3$ ($\approx \pi(n-1)/3$). In addition we show the effect of length and confinement on the average crossing number of a random polygon.

Department of Mathematics, UNC Charlotte, Charlotte, NC 28223