# Generating Random Walks and Polygons with Stiffness in Confinement

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**Abstract**

The purpose of this paper is to explore ways to generate random walks and polygons in confinement with a bias toward stiffness. Here the stiffness refers to the curvature angle between two consecutive edges along the random walk or polygon. The stiffer the walk (polygon), the smaller this angle on average. Thus random walks and polygons with an elevated stiffness have lower than expected curvatures. The authors introduced and studied several generation algorithms with a stiffness parameter $s > 0$ that regulates the expected curvature angle at a given vertex in which the random walks and polygons are generated one edge at a time using conditional probability density functions. Our generating algorithms also allow the generation of unconfined random walks and polygons with any desired mean curvature angle. In the case of random walks and polygons confined in a sphere of fixed radius, we observe that, as expected, stiff random walks or polygons are more likely to be close to the confinement boundary. The methods developed here require that the random walks and random polygons be rooted at the center of the confinement sphere.

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