

Moduli space of planar polygons:
a topological study of mechanical linkages

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A mechanical linkage consists of several bars connected by revolving joints. The space of all possible configurations of a given linkage play an important role in areas like molecular biology and robotic motion planning. A mathematical object that models this space is the moduli space of planar polygons. Given n real numbers, this moduli space is the set of all orientation-preserving isometry classes of n -gons with these numbers as side lengths. Under certain favourable conditions, this space is a closed, orientable manifold. As a trivial example, there are only two possible triangles of side lengths 1, 1 and 1, up to rotations and translations of the plane. So the resulting moduli space is the 0-sphere. In this talk, I will introduce some of the key concepts and discuss the main results in the theory. Then I will describe a combinatorially defined cell structure on this space. Towards the end I will give an overview of the ongoing work, with N. Adhikari, of constructing a discrete Morse function on a certain quotient of this space.