

Limits of Polygon Spaces

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Abstract

Polygon spaces are topological spaces that encode the dynamics of polygons as they hinge about their vertices. A polygon space is determined by a number n of edges, a vector $\ell = (l_1, \dots, l_n)$ of edge lengths, and a dimension d of the ambient space in which the polygons live. Michael Farber and Viktor Fromm showed that by fixing d and n and allowing ℓ to vary, there are finitely many diffeomorphism types of smooth polygon spaces. We show that upon fixing n and ℓ and allowing d to vary, there are only finitely many homeomorphism types of polygon spaces, smooth or not. The dimension of a polygon itself, as distinct from the dimension of the ambient space, is missing from previous literature and plays the key role in our result.

Keywords: Polygons, moduli spaces, configuration spaces.