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Cantarella, Jason (1-PA); **Johnston, Heather** (1-RTG)

Nontrivial embeddings of polygonal intervals and unknots in 3-space. (English summary)

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Are the connected components of the space of polygons of fixed side lengths (embedding classes of such polygons) simply knot types, or do there exist distinct embeddings of the same knot? The notation $\mathrm{Pol}_n(l_1, l_2, \cdots, l_n)$ (or simply Pol_n) is used to denote this space, where $l_1, l_2, \cdots, l_n$ are the lengths of the sides. In this article it is shown that there exist “stuck” unknots which cannot be deformed to convex polygons for suitable choices of edge length in Pol_n for all $n \geq 6$. Furthermore, it is shown that for any knot or link type, there exists some n for which there are geometrically different examples of that knot or link type. The number of different embedding classes of a given knot type increases with n, becoming infinitely large as $n \to \infty$.

This article also includes a study of embedding classes of polygonal intervals and gives a classification of all embeddings of polygonal intervals of five segments with fixed lengths. The space of such embeddings has three connected components for suitable edge lengths.

Research in this and other aspects of PL knot theory by Millett, Randell, Simon and some others are listed in the references.

Reviewed by *Peiyi Zhao*