Recognizing Trivial Links in Polynomial Time

Chad Musick

Nagoya University

Abstract. Trivial links are unique up to number of link components, but they can be hard to recognize from arbitrary diagrams. We define a measure, the crumple, on link diagrams and then demonstrate that for trivial links there is a sequence of moves by which the crumple may be strictly monotonically reduced. By our definition, the minimum possible crumple over all link diagrams is achieved only by embedding components disjointly in parallel planes, and so a link will be able to obtain this crumple if and only if it is trivial. The crumple is quadratic in the number of crossings, and we show that finding each reducing move takes only polynomial time and linear space. Therefore, we may decide whether a link is trivial in time polynomial on the number of crossings of a diagram of the link.