Garamvölgyi, Dániel
Global rigidity of (quasi-)injective frameworks on the line. (English) Zbl 07431839
Discrete Math. 345, No. 2, Article ID 112687, 8 p. (2022)

Summary: A realization of a graph $G$ is a pair $(G, p)$ where $p$ maps the vertices of $G$ into Euclidean space $\mathbb{R}^d$. The realization is injective if $p$ is injective and quasi-injective if for each edge of $G$, $p$ maps the endpoints of the edge to different points in space. The realization is globally rigid if any realization $(G, q)$ in $\mathbb{R}^d$ with the same edge lengths is congruent to $(G, p)$. In this paper we characterize graphs that have an injective (quasi-injective, respectively) non-globally rigid realization in $\mathbb{R}^1$, and we show that the problem of recognizing these graphs is NP-complete in both the injective and the quasi-injective cases. Our characterizations are based on the notion of NAC-colorings, which have been used previously to investigate similar problems in the plane. We also give an overview of related results and open problems in rigidity theory.

MSC:
52C25 Rigidity and flexibility of structures (aspects of discrete geometry)
05C78 Graph labelling (graceful graphs, bandwidth, etc.)
68U05 Computer graphics; computational geometry (digital and algorithmic aspects)

Keywords:
global rigidity; NAC-coloring; S-prime; NP-complete

Full Text: DOI

References:

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.