Geometry Seminar
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Room 1013, Courant Institute
251 Mercer Street, New York

Issues in motion planning of metamorphic systems

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Abstract

We address a number of issues related to motion planning and analysis of both rectangular and hexagonal metamorphic robotic systems. We first present a distributed algorithm for reconfiguration that applies to a relatively large subclass of configurations, called horizontally convex configurations, of a rectangular system. We then discuss several fundamental questions on the analysis of metamorphic systems. In particular the following two questions are shown to be decidable:

(i) determining whether a given set of motion rules maintains connectivity;

(ii) whether a goal configuration is reachable from a given initial configuration (at specified locations).

In the general case in which each module has an internal state, the following is shown to be undecidable: given a set of motion rules, determine whether there exists a certain type of configuration called a uniform straight-chain configuration that yields a disconnected configuration.

This is joint work with Ichiro Suzuki and Masafumi Yamashita.

For further information contact Janos Pach at pachcims.nyu.edu, or visit our website: http://www.math.nyu.edu/seminars/geometry_seminar.html