

Geometry Seminar
Tuesday, January 6, 2011
Room 201 WWH at 6:00 P.M.

Generic Periodic Rigidity

Justin Malestein
Temple University

A periodic framework in the plane is an infinite structure, periodic with respect to a lattice and made of fixed-length bars connected by universal joints with full rotational degrees of freedom. The allowed (continuous) motions are those that preserve the lengths and connectivity of the bars and periodicity of the framework while furthermore allowing the underlying lattice to change continuously with the framework. A periodic framework is rigid if the only allowed motions are isometries of Euclidean space.

In a recent paper, Louis Theran and I prove a condition for generic periodic frameworks in dimension 2 to be rigid. This condition is described in terms of an associated finite colored graph and can be checked in polynomial time. Along the way, we introduce a new matroidal family of "hereditarily sparse" graphs to capture the degrees of freedom in periodic frameworks. I will talk about these results, and if there is time, discuss generalizations to frameworks with crystallographic symmetry.

For more information please visit the seminar website at:
http://www.math.nyu.edu/seminars/geometry_seminar.html.