

Geometry Seminar
Tuesday, November 3, 2009
Room 202 WWH at 6:00 P.M.

Global Rigidity

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Consider a straight line embedding of a finite graph in Euclidean space. When any other embedding of the graph with the same edge lengths is congruent to the original, we say it is globally rigid. How do you tell?

Some years ago Bruce Hendrickson showed certain necessary conditions for global rigidity when the configuration of vertices of the graph are in generic position, which he conjectured were sufficient. Recent results of Jackson, Jordn and Berg proved that Hendrickson's conjecture was true in the plane and this provides a good combinatorial algorithm to determine planar generic global rigidity.

I found one example of a graph in three-space that was a counterexample to Hendrickson's conjecture. More recently Gortler, Healey, and Thurston have shown that a numerical criterion, in terms of a stress matrix that I showed was sufficient for generic global rigidity, was also necessary. Even more recently, Jordn, Whiteley and I have shown that when the graph is composed of rigid bodies joined by bars, then there is a polynomial-time combinatorial algorithm that computes its generic global rigidity.

Very, very recently Jiayang Jiang and Sam Frank, two students at Columbia, have shown that there is a large class of graphs that are generically globally rigid, but do not satisfy Hendrickson's conditions, and in particular there are infinitely many such graphs in dimension 5 and higher.

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