Geometry Seminar
March 8, 2005, Tuesday, 6:00 p.m.
Room 613, Courant Institute
251 Mercer Street, New York

Convex polytopes, rigidity, and classical geometry

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Abstract

Cauchy Theorem states that simplicial polytopes in three dimensions are rigid, so in principle one should be able to "construct" a polytope from its graph and edge lengths. Actually doing this is more complicated even in the most simple special cases...

In this talk we review several approaches to the problem. We start with the Alexandrov "existence theorem", then switch to a remarkable Kapovich-Millson "universality theorem" on planar linkages, and then outline Sabitov's polynomials for nonconvex polyhedra. The latter work is related to Sabitov's proof of the "bellows conjecture" that flexible polyhedrons must keep its volume constant under continuous deformation. We conclude with joint results of Fedorchuk and myself on the degrees of Sabitov polynomials and sketch our proof of the Robbins conjecture on the area of cyclic polygons.

The talk should be accessible to anyone who has seen an icosahedron, or at least heard about it...

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