APPLIED MATHEMATICS COLLOQUIUM

PROJECTIVE PRE-CONDITIONERS FOR IMPROVING THE BEHAVIOR OF A LINEAR OR CONIC INEQUALITY SYSTEM

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ABSTRACT:

We present a general theory for transforming a homogeneous linear or conic inequality system *F: Ax = 0, x >= 0* (or more generally, $x \in C$), *x* non-zero, to an equivalent system via projective transformation induced by the choice of a point in a certain related dual set. Such a projective transformation serves to "pre-condition" the conic system into a system that has both geometric and computational complexity properties with certain guarantees. Furthermore, we show that there must exist projective transformations that transform *F* to a system with desirable geometric properties and whose computational complexity is strongly-polynomial-time in *m* and the barrier parameter of the cone *C*. We present a method for generating such a projective transformation based on random sampling in the associated dual set, with associated probabilistic analysis. Finally, we present computational results that indicate that the random sampling methodology holds the promise to markedly reduce the overall computation time for solving conic feasibility problems; for instance we observe a 46% decrease in average interior-point method (IPM) iterations for 100 randomly generated poorly-behaved problem instances of dimension 1000 *x* 5000. This work is joint with Alexandre Belloni.

MONDAY, FEBRUARY 13, 2006
4:30 PM
Building 2, Room 105

Reception at 4:00 PM in Building 4, Room 174.
(Math Majors Lounge)

Applied Math Colloquium: http://www-math.mit.edu/amc/spring06
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