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Deciding Feasibility of Polynomial Inequalities by Numerical Filtering. Preliminary report.

Deciding the feasibility (existence of solution) of system of polynomial inequalities is a fundamental problem in computational real algebraic geometry. Furthermore, it has many applications in science and engineering. Thus, there has been extensive research on the problem. However, many important and challenging application problems are still practically out of reach for the existing algorithms in spite of tremendous progress made in their efficiency during last 60 years.

In this talk, we will describe an efficient numerical "filter" that can decide the feasibility for "most" cases. We need to call the existing symbolic algorithms only when the filter fails (which is rare). (Received February 03, 2009)