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*ArtinProver: a truly hybrid symbolic/numeric global optimization algorithm.* Preliminary report.

ArtinProver is an algorithm that computes a numeric fraction of polynomial sums-of-squares (SOS) for a positive semi-definite (PSD) polynomial or rational function and then converts the SOS/SOS into an exact identity with rational coefficients. We will report on progress made in the last year on both the numeric semi-definite programming and the rationalization step to solve several examples from the SOS literature and other polynomial inequalities presented to us. We have proved the Monotone Column Permanent Conjecture for dimension four and found accurate bounds for Rump's model problem as far as factor degree 17. We also will present ideas on PSD polynomials with numeric coefficients and examine the role of Sturmfels's rational SOS conjecture for PSD polynomials with rational coefficients.

This is joint work with our students Feng Guo and Sharon Hutton. (Received September 21, 2009)