Mechanical & Aerospace Engineering

seminar

Chordal Structure and Polynomial Systems

March 4, 2016 at 1:30pm in SCOB 228

abstract

Techniques based on chordal structure and bounded treewidth have been extensively studied in linear algebra, graphical models, constraint satisfaction, database theory, and many other areas. It is natural then to analyze to what extent chordality might also help to solve systems of polynomial equations. To this end, we propose a new technique, which we refer to as chordal elimination, that relies in elimination theory and Gröbner bases. By maintaining the graphical structure of the input polynomial system in all computations, chordal elimination can outperform standard Gröbner basis algorithms in many cases. Besides the theoretical developments, in this talk we will illustrate the suitability of our methods in examples arising from graph colorings, cryptography, sensor localization and differential equations. Based on joint work with Diego Cifuentes (MIT).

biosketch

Pablo A. Parrilo is a Professor of Electrical Engineering and Computer Science at the Massachusetts Institute of Technology. He is currently Associate Director of the Laboratory for Information and Decision Systems (LIDS), and is also affiliated with the Operations Research Center (ORC). Past appointments include Assistant Professor at the Automatic Control Laboratory of

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biosketch (cont'd) The Swiss Federal Institute of Technology (ETH Zurich) and Visiting Associate Professor at the California Institute of Technology. He received an Electronics Engineering undergraduate degree from the University of Buenos Aires, and a PhD in Control and Dynamical Systems from the California Institute of Technology.

His research interests include optimization methods for engineering applications, control and identification of uncertain complex systems, robustness analysis and synthesis, and the development and application of computational tools based on convex optimization and algorithmic algebra to practically relevant engineering problems.

Prof. Parrilo has received several distinctions, including a Finmeccanica Career Development Chair, the Donald P. Eckman Award of the American Automatic Control Council, the SIAM Activity Group on Control and Systems Theory (SIAG/CST) Prize, the IEEE Antonio Ruberti Young Researcher Prize, and the Farkas Prize of the INFORMS Optimization Society. He is an IEEE Fellow.