1117-68-299 **Diego Cifuentes*** (diegcif@mit.edu), 77 Massachussets Avenue, 32-D760, Cambridge, MA 02139, and **Pablo A Parrilo** (parrilo@mit.edu), 77 Massachusetts Avenue, 32D-726, Cambridge, MA 02139. *Chordal structure and polynomial systems.*

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 in computational algebraic geometry. To this end, we propose new techniques for solving polynomial equations by means of Gröbner bases and triangular sets. By maintaining the graphical structure of the input polynomial system in all computations, our methods can outperform standard algorithms in many cases. In particular, for a restricted class of ideals, the computational complexity is linear in the number of variables. Our methods can be used to tackle several important computational problems for polynomial ideals, such as feasibility, dimension, counting isolated solutions and radical ideal membership. Besides the theoretical developments, we illustrate the suitability of our methods in examples arising from graph colorings, cryptography and sensor localization. (Received January 16, 2016)