

Meeting: 1003, Atlanta, Georgia, SS 8A, AMS Special Session on Modular Representation Theory of Finite and Algebraic Groups, I

1003-14-1499 **Sanjay Lall*** (lall@stanford.edu), Aeronautics and Astronautics, Mail Code 4035, Stanford University, Stanford, CA 94305. *Automated Certification for Control Systems*. Preliminary report.

Recent developments in computational real algebraic geometry and the theory of certificates and duality have led to new algorithms for a wide class of combinatorial, non-convex and non-linear optimization and control problems. At the same time, there has been a new emphasis on control problems that are intrinsically computationally hard, for example where there is an explicit combinatorial structure.

We discuss a number of applications of real algebraic geometry to problems in control engineering, using semidefinite programming for computation. These include power control in wireless sensor networks with interference, combined task assignment and path planning for multiple vehicle systems, and multi-limbed robotic systems. We also discuss control systems where the source of apparent intractability is not due to a combinatorial growth, but instead the need for decentralization introduces complexity due to the structure of the desired control design. (Received October 05, 2004)