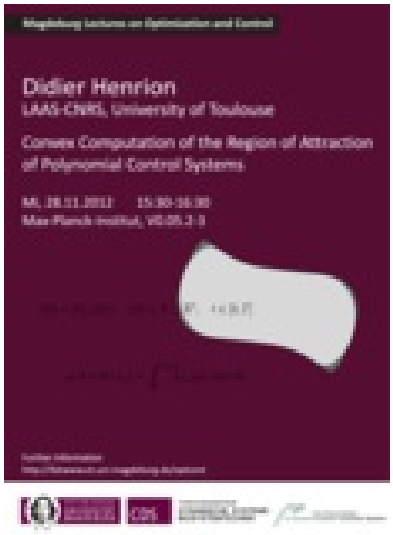
OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

MAGDEBURG LECTURES ON OPTIMIZATION AND CONTROL

Didier Henrion



Convex Computation of the Region of Attraction of Polynomial Control Systems

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Time & Place
The presentation will be given on November 28, 2013 at 3.30 p.m. and takes place at the ›Max Planck Institute, V0.05/2-3
(http://www.mpi-magdeburg.mpg.de/institute/way.en.html)

Abstract
We address the problem of computing the region of attraction (ROA) of a target set (typically a neighborhood of an equilibrium point) of a controlled nonlinear system with polynomial dynamics and semialgebraic state and input constraints. We show that the ROA can be computed by solving a convex linear programming (LP) problem over the cone of nonnegative measures. In turn, this problem can be solved approximately via a converging hierarchy of convex finite-dimensional linear matrix inequalities (LMIs). The dual LP on nonnegative continuous functions (approximated by polynomial sum-of-squares) allows us to generate a hierarchy of guaranteed semialgebraic outer approximations converging almost uniformly to the ROA. This is joint work with Milan Korda and Colin N. Jones, Ecole Polytechnique Federale de Lausanne, Switzerland.

Short CV
Currently he is a CNRS "Directeur de Recherche" (senior researcher) at LAAS in the research group MAC. He is also holding a secondary appointment as an associate professor at the Department of Automatic Control of the Faculty of Electrical Engineering of the Czech Technical University in Prague.

He received the "Diplôme d'Ingénieur" (Engineer's Degree) and the "Diplôme d'Etudes Approfondies" (Masters' Degree) with specialization in control from Institut National des Sciences Appliquées (INSA, National Institute for Applied Sciences), Toulouse, Southwestern France, in September 1994. From October 1994 to December 1995 he was a research assistant at Universidad Simón Bolívar, Caracas, Venezuela. From February 1996 to December 1998 he was a Ph.D. student at Ustav Teorie Informace a Automatizace (UTIA, Institute of Information Theory and Automation), Prague, Czech Republic. From October 1996 to August 1999 he was a Ph.D. student at Laboratoire d'Analyse et d'Architecture des Systèmes (LAAS, Laboratory of Analysis and Architecture of Systems) of Centre National de la Recherche Scientifique (CNRS, National Center for Scientific Research) in Toulouse, France. He received the "Candidate of Sciences" (Ph.D.) degree from

Akademie Ved Ceske Republiky (Academy of Sciences of the Czech Republic) in December 1998, the "Diplôme de Doctorat" (Ph.D. degree) from INSA Toulouse in October 1999, the "Diplôme d'Habilitation à Diriger des Recherches" (French Habilitation) degree from Université Paul Sabatier de Toulouse in December 2007, and the "Docent" (Czech Habilitation) degree from Ceske Vysoke Uceni Technicke v Praze (CVUT, Czech Technical University in Prague) in June 2008. In 2004 he was awarded the Bronze Medal from CNRS, for his achievements in systems control theory. In 2005 he was awarded, jointly with Fredrik Kahl, the David Marr Prize for the best paper at the International Conference on Computer Vision. In 2011, upon recommendation by a committee of the French Acadèmie des Sciences, he was awarded a scientific grant by the Simone and Cino del Duca Foundation of the Institut de France, on the topic of applied mathematics. In 2012 he was awarded, jointly with Jérôme Malick, the Charles Broyden prize for the best paper in the journal Optimization Methods and Sofware.