RECENT ADVANCES IN VERIFICATION AND ANALYSIS OF HYBRID SYSTEMS

Janan Zaytoon
University of Reims Champagne Ardennes
France

Abstract: Formal verification of properties is a very important area of analysis of hybrid systems. It is, indeed, essential to use methods and tools to guarantee that the global behaviour of a system is correct and consistent with the specifications. This is especially true for safety properties that insure that the system is not dangerous for itself or its environment.
Classically, verification of Safety properties may be performed with reachability computation in the hybrid state space. Basic ideas have not really evolved since the first works, however new techniques have been proposed and algorithms have been improved.
The aim of this talk is to present the problem of verification and reachability computation for hybrid systems and to propose a classification of recent improvements. To overcome the difficulties in verification and reachability analysis it is necessary to make choices regarding general principles, algorithms and mathematical representation of regions of the continuous state space. These choices depend on each other and must be consistent. However all approaches are based on common considerations that will be used to structure the talk.

BRIEF BIOGRAPHY

Born in 1962, Janan Zaytoon (BSc Eng./1983, MSc Eng./1986, DEA/1988, PhD/1993, Habilitation/1997) is Professor and Head of the CReSTIC Research Centre (involving 150 researchers) at Reims University. He was a member of the Administration Council of the same University (2003-2006). He is the Chair of the French national research network/group "GDR MACS of CNRS", which involves all the researchers in the field of Automatic Control Syetems in France (about 2000 researchers and PhD students).

His involvement in IFAC includes his service as member of the IFAC Council from 2008 to 2011, head of the French National Member Organizer since 1999, Chair of Technical Committee on Discrete Event and Hybrid Systems from 2005 to 2008, Vice-Chair of this Technical Committee from 2002 to 2005 and 2008 to 2011, member of the Publication Committee of IFAC from 2008 to 2011, Editor of the IFAC Journal "Control Engineering Practice" and the Affiliated IFAC Journal "Nonlinear Analysis: Hybrid Systems".

Professor Janan Zaytoon is the author/co-author of 70 journal papers, 3 books, 12 book chapters, 120 conference papers, and 8 patents. His main research interests are in the fields of Discrete Event Systems, Hybrid Dynamic Systems, Intelligent Control and Biomedical Engineering. He is an associate Editor of "IET Control Theory and Applications" and "Discrete Event Dynamic Systems", IPC and/or NOC Chair/Co-Chair of 15 Conferences, Editor/Co-Editor of 10 Conference Proceedings, Keynote speaker for 6 conferences, supervisor of 20 PhD students, Guest Editor/Co-editor for 18 special issues of 6 international and 2 national journals, leader of 8 industrial contracts, and was Chair of the WODES (International Workshop on Discrete Event Systems) steering Committee.