Control of Switching Systems by Invariance Analysis (Invited Talk)

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Abstract

Switched systems are embedded devices widespread in industrial applications such as power electronics and automotive control. They consist of continuous-time dynamical subsystems and a rule that controls the switching between them. Under a suitable control rule, the system can improve its steady-state performance and meet essential properties such as safety and stability in desirable operating zones. We explain that such controller synthesis problems are related to the construction of appropriate invariants of the state space, which approximate the limit sets of the system trajectories. We present a new approach of invariant construction based on a technique of state space decomposition interleaved with forward fixed point computation. The method is illustrated in a case study taken from the field of power electronics.

This work is a joint work with Romain Soulat.

Short Biography

Laurent Fribourg is a CNRS Senior Researcher working at École Normale Supérieure de Cachan (ENSC), France. Since 2007, he has been Scientific Coordinator of Institut Farman, which federates interdisciplinary projects between 5 Laboratories of ENSC. He has been Director of LSV, the Computer Science Lab. of ENSC since 2011. He has written more than 70 international publications in the field of Logic Programming, Program Testing, and Model Checking.