ON THE CONTROLLER SYNTHESIS FOR LINEAR HYBRID SYSTEMS

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ABSTRACT

This paper deals with the control of a class of perfectly modelled linear hybrid systems which consist of two, in general coupled, subsystems one being continuous-time while the second one is digital. Both subsystems are driven by continuous time and sampled values of a control input. The description of the overall system is given through an extended hybrid system, which is purely discrete at sampling instants, which has two, in general, coupled continuous-time and discrete-time substates. The discrete-time substate is jointly defined by the digital substate and the samples of the continuous substate while being driven by the sampled input. The control objective has a double nature and it consists of the achievement of separate continuous-time and discrete-time model-matching objectives with respect to two predefined stable reference models. It is achieved by synthesizing a dynamic hybrid controller consisting of a continuous subcontroller and a discrete one. Each of those controllers has its own control objective, namely, the achievement of closed-loop model-following of a prescribed continuous-time or sampled-time reference model. The discrete reference dynamics could potentially be run at slow sampling periods and used for periodic re-adjustment of the continuous one in terms of variations of high-frequency gains, set points or inputs to the continuous reference model.

KeyWords: Control objectives, hybrid systems, model-matching.