

DESIGN OF NUMERICAL SUBSYSTEMS FOR NONLINEAR HARDWARE-IN-THE-LOOP SIMULATORS

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Abstract

This talk will describe a new methodology for the design of numerical subsystems for hardware-in-the-loop (HWIL) simulators. The term HWIL simulation is used to refer to a testing paradigm in which difficult to model parts of the hardware of an engineering system are interfaced through transducers to a numerical model of the rest of the system, with the intention of simulating the behaviour of the complete hardware. In this work, the numerical subsystem design task is described, problems with the current best practice are identified, criteria for optimal designs are derived, and a novel optimisation-based design method leveraging these criteria is presented. The new design method is applicable to a wide class of uncertain, non-linear systems. Experimental results are provided.