

IASTED Modeling and Simulation**Opal-RT Presentation Date:** Wednesday, May 24th, 2006**Location:** Opus II Room**Time:** 9:30 a.m.**Presenter:** Jean Belanger**Conference Program:** <http://www.iasted.org/conferences/2006/Montreal/MS2006FinalProgram-Web.pdf>**Title:**

Challenge and Solution for Large-Scale Multi-Domain Real-time Simulation of Dynamic Systems

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Abstract:

Model-based design is becoming a de facto method to design and test the performance of real-time controllers used in automobiles, aircrafts, robotics, power electronic systems, power grid and any other complex dynamic systems. Such systems involve the design, optimization and coordination of several interconnected digital controllers that must control plants with time constants ranging from microseconds to seconds. Such optimization and testing require sophisticated multi-domain real-time simulators capable to simulate each subsystem with a level of accuracy sufficient to achieve project objectives from the point of view of control performance expected under normal and faulty operating condition.

This presentation will provide an overview of faster-than-real-time and hard real-time simulation technology evolution, challenges and solutions to implement advanced distributed simulators using open and off-the-self computer cluster technologies. Difficulties encountered for the simulation of very large multi-domain dynamic systems, containing slow mechanical systems integrated with very fast power electronic subsystems will be described together with solutions developed by industries and research organizations. A novel open co-simulation method enabling the simultaneous usage of several heterogeneous multi-domain custom and commercial simulation tools, such as SIMULINK™, DYMOLA™, AMESIM™ and RT-LAB™ to simulate complex systems will also be described. Performance obtained with INFINIBAND™ and AMD™ Opteron cluster for the simulation of very large dynamic systems will be presented.