

Potential of distributed simulation by HLA/RTI for satellite designing and verification

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We have been developing a satellite simulator based on object-oriented design. The simulator should be useful to optimize satellite concept designs and reuse the simulation models as well as to shorten development cycles. The simulator aims to be applicable in the life cycle of various satellites, that is capable of simulating dynamics, control subsystems, power subsystems, telemetry command subsystems and mission subsystems. It can link up with other software such as CAD, control system analysis, structure analysis software and space environment simulators. Moreover, on-board models verification (on-board software, hardware-in-the-loop) can be performed using the system.

One of the functions of the system enables distributed simulations between the core bus system module and the mission system module, the environment simulators, or the other existing software. Using simple distributed simulation models, we have examined a distributed computing middleware, HLA/RTI(High-Level Architecture/Run-Time Infrastructure) at first which is proposed by DMSO(Defense Modeling and Simulation Office), Department of Defense, USA, and achieved satisfactory results also by ESA(European Space Agency) and the related enterprises. We discuss the validity of the middleware for our application.

In addition to the function for the distributed simulation, the system will be equipped with databases not only for simulation models but also for satellite design information to reuse them easily. The system will be useful for a space agency and a satellite developer or a mission responsible institute in efficient development processes.

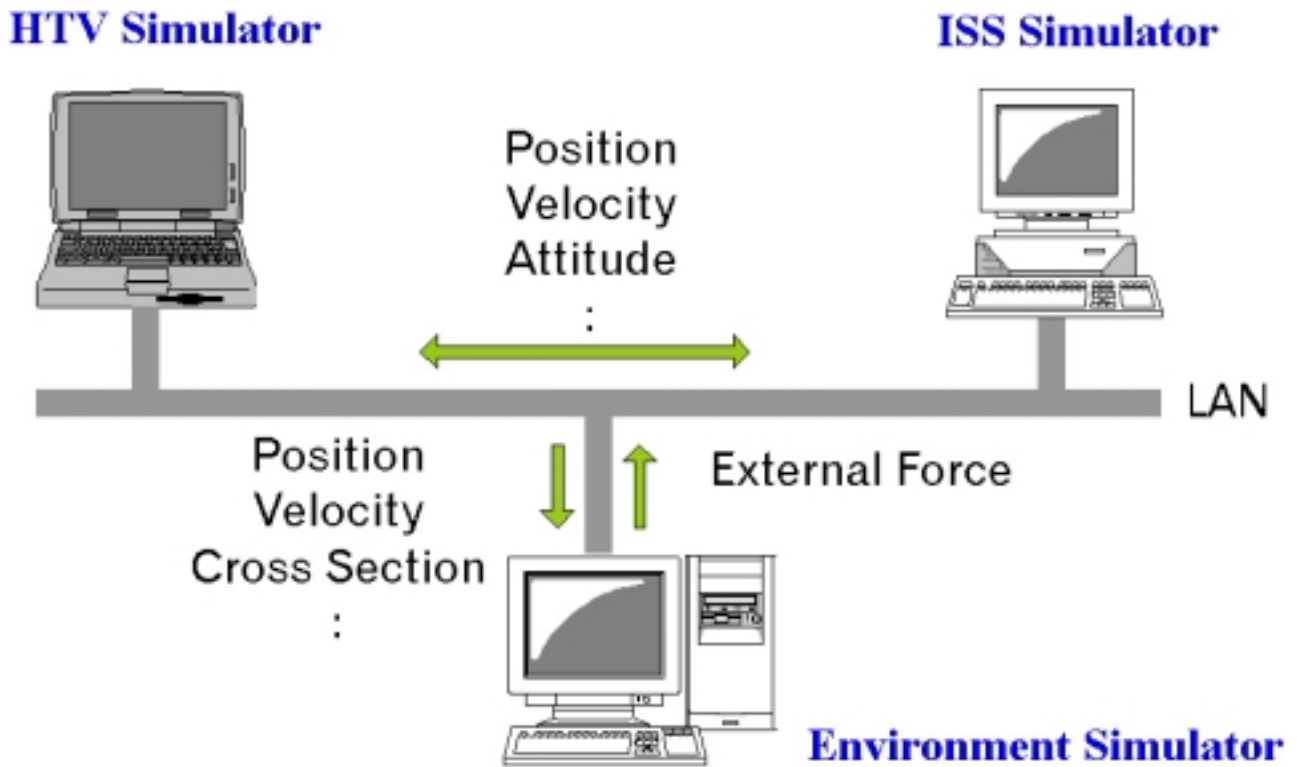


Fig.1 A test model of distributed simulation.