ABSTRACTS

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SIMULATING FSPN MODELS USING PROCESS-BASED DISCRETE-EVENT SIMULATION LANGUAGE

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Abstract: Fluid Stochastic Petri Nets (FSPN) is a mathematical and graphical formalism designed for modeling and behavior evaluation of complex stochastic and hybrid systems that concurrently employ discrete and continuous logic. Analytic performance evaluations of FSPN models require a solution to a complex system of partial differential equations whose generation and solution can easily become intractable. This problem occurs because the number of differential equations in the system directly corresponds to the number of discrete states of the FSPN model. For FSPN models that exhibit large state spaces, the only feasible solution method is by the use of simulations. However, for certain FSPN models, the existing FSPN simulation methods and software packages do not provide a feasible solution, which was the main motivation to describe the simulation challenges of certain FSPN models and explore for possible alternatives. In this paper, two approaches for simulation of FSPN models using process-based discrete-event simulation language are presented. The two different approaches are evaluated in the context of simulation speed and accuracy. The results obtained show that continuous quantities in FSPN models can be effectively simulated using discrete events without compromising the accuracy of the simulation outcome.