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Fluid stochastic Petri nets: Theory, applications, and solution techniques. (English)

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Summary: We introduce a new class of stochastic Petri nets in which one or more places can hold fluid rather than discrete tokens. We define a class of fluid stochastic Petri nets in such a way that the discrete and continuous portions may affect each other. Following this definition we provide equations for their transient and steady-state behavior. We present several examples showing the utility of the construct in communication network modeling and reliability analysis, and discuss important special cases. We then discuss numerical methods for computing the transient behavior of such nets. Finally, some numerical examples are presented and evidence of the accuracy of the fluid approximation is given.

MSC:

90B10 Deterministic network models in operations research

90C40 Markov and semi-Markov decision processes

Cited in 19 Documents

Keywords:

stochastic processes; Markov processes; stochastic Petri nets; probability

Software:

SPNP

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