
Iterative specification as a modeling and simulation formalism for I/O general systems: Application to neuronal spiking networks

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Résumé

Beyond functional systems, a vast class of models do not exhibit analytical solutions. Simulation is often used to approximate these solutions in a computational manner. An alternative is to include the simulation structure as a part of a modeling formalism. This article aims at exploiting iterativesystem specification as a modeling formalism. The systems specified are dynamic with inputs/outputs (I/O) that can be coupled in a modular way. The iterative specification consists of a decomposition of the I/O behavior of a system into trajectory segments. We prove that specific decompositions can be combined while ensuring that the overall I/O behavior is correctly represented. While generic in nature, the approach is verified against leaky integrate and fire neuronal modeling applications.

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