CSC Seminar

SPEAKER

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TITLE

On mixture approximations for differential equations with distributed time delays

ABSTRACT

Mixture approximations are relevant to many problems in science and engineering, including distributed time delays in differential equations, probability density functions, e.g., as the solution to stochastic differential equations, and continuous thermodynamics (e.g., for phase equilibria and chemical reaction equilibria). In this presentation, we will discuss Gaussian, Erlang, and beta mixture approximations of density-like functions with infinite, semi-infinite, and bounded support, respectively. In particular, we will discuss how Erlang and beta approximations can be used to simplify the analysis and simulation of delay differential equations with distributed time delays by permitting a transformation to a set of ordinary differential equations (ODEs). Furthermore, we will demonstrate the utility of the approximations for steady state stability analysis, Monte Carlo simulation, and delay identification for two example systems: A modified logistic equation and a model of a molten salt nuclear fission reactor.

Thursday, August 12, 2025 at 2 pm
seminar room Prigogine