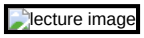

Visions for Quantitative Biology Lecture Series

Dynamic Data-Driven Application Simulations (DDDAS)

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Abstract:
DDDAS is a new paradigm in which data dynamically controls almost all aspects of long term simulations. Rather than run many simulations using static data as initial conditions, a very small number of simulations are run with additional data injected as it becomes available. The dynamic data is used to determine * (a) whether or not a warm restart is necessary due to unacceptable errors building up in parts of the domain, * (b) if a rollback in time is required, or * (c) if the simulation is running with acceptable errors. Ideally, there does not have to be a human in the control loop throughout a simulation. Using the data appropriately lets the physical and matematical models, the discretization, and the scales of interesting parts of the computations become parameters that can be changed during the course of the simulation. In addition, error propogation is of particular interest in nonlinear time dependent simulations. DDDAS offers interesting computational and mathematically unsolved problems, such as, how do you analyze the properties of a generalized PDE when you do not know either where or what the boundary conditions are at any given moment in the simulation in advance? DDDAS techniques will be described for two NSF supported ITR projects: contaminant transport and wildfire simulation.

Speaker's Bio:
N/A

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