COMPUTATIONAL RESEARCH in BOSTON and BEYOND SEMINAR

Multiscale and multiphysics technologies for biomechanics and tokamaks

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ABSTRACT:

Multiscale and multiphysics phenomenon lie at the heart of many of today's most transformational problems ranging from human health and disease to fusion power, one of the most promising solutions for clean energy. Although tremendous progress has been made in high fidelity modeling, new tools and algorithms are required to unlock the vast potential of multiscale and multiphysics applications on exascale supercomputers and novel hardware accelerators.

In this talk I will show how advancements in numerical algorithms, physical understanding, high-performance parallel software, and machine learning has been leveraged to gain a greater understanding of the multiscale behavior of fibrous biological tissues including new insights related to the micromechanical causes of neck and back pain. And to perform multiphysics code-coupling and parallel control of gyrokinetic fusion reactor simulations with no data structure or algorithm modifications to the coupled codes; a key step in enabling exascale plasma simulations as needed to bring fusion power to the grid.

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