Innovation in Computational Simulation of Structures at Sandia National Laboratories

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Abstract:

In-house computational simulation tools are crucial to mechanical engineers at Sandia National Labs making daily decisions impacting national security. The unique, high-fidelity requirements of their structural models drive the need for high-performance computing at the Labs, and the computer scientists and engineers who design these simulation codes are tasked with delivering accuracy and performance. This talk will introduce the motivation for large-scale simulations at Sandia and the software developed to meet those needs, especially the suite of tools known as Sierra. In addition to established practical applications, core simulation capabilities require targeted research and development to address emerging needs. In particular, the talk will cover recent advances in computational modeling of structures in one focus area: structural dynamics at ultra-high frequencies.

Bio:

Dr. Julia Plews is a Principal Member of Technical Staff at Sandia National Laboratories, where her primary role is team lead for Sierra Structural Dynamics, a finite element analysis tool for large-scale dynamics, acoustics, and coupled physics simulations run on some of the nation's largest supercomputers. Dr. Plews obtained her B.S. (2009), M.S. (2011), and Ph.D. (2015) degrees in Civil Engineering from the University of Illinois at Urbana-Champaign, specializing in multi-scale simulations of localized thermal-structural effects. Since obtaining her Ph.D., Dr. Plews has spent the past seven years as a software developer on interdisciplinary simulation tools at Sandia. Her research interests include high-performance computing and software design for heterogeneous architectures, advanced finite element methods, multi-scale modeling, and simulation of damage and failure in structures.

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1310 Yeh Student Center