



MECHANICAL AND AEROSPACE ENGINEERING
HENRY SAMUELI SCHOOL OF ENGINEERING AND APPLIED SCIENCE, UCLA

MECHANICAL AND AEROSPACE ENGINEERING DEPARTMENTAL
SEMINARS
SPECIAL ENGAGEMENT

“In-situ Data Management to Enable Analytics”

Steve M Legensky

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Wednesday, May 22, 2019
11:00 am – 12:00 pm
47-124 Eng. IV



Abstract: The term *in situ* is broad and encompasses many strategies for computing data products from the simulation as it runs. Typically, *in situ* means that data products are generated in the same address space as the simulation by operating directly on simulation data structures while the calculation is paused. *In transit* techniques are a variation on *in situ*; these methods permit the simulation to quickly send its raw data to additional compute resources, usually another set of analysis nodes on the HPC system which perform reductions to create the desired data products. *In transit* has the benefit that the simulation “writes” its data and then continues its computations, while the analytics code executes at the same time on additional HPC nodes. This design is robust and has the benefit that the simulation is free to continue its computations after sending its data to the analysis nodes. Images or movies have been the most common data products of these

processes, enabling post-hoc visualization. Intelligent Light advocates the use of 3D *extracts* as a data product so that post-hoc analysis can be more flexible and numerical as well as visual. This talk will review our work over the past few years, developing *in transit* reduced order surrogate models via POD and dynamic mode decomposition (DMD) in the *extract* process, enabling greater compression and post-hoc analysis based on the Eigen basis functions of the underlying dynamical system, via signatures of complex unsteady CFD computations.

Biosketch: Steve Legensky began working in computer graphics way back in 1974 while completing his Bachelor of Engineering degree at Stevens Institute of Technology in 1977. He continued his studies at Stevens while working with faculty there to establish and manage an NSF-funded Undergraduate Computer Graphics Facility, which was dedicated to finding ways to incorporate interactive graphics into the mechanical engineering curriculum. After receiving his master’s degree in mathematics in 1979, Legensky went into industry, in the area of real-time image generation for flight simulation. In 1984, he founded Intelligent Light, which has evolved from producing award-winning 3D animations to launching a set of integrated 3D rendering and animation solutions, to the current FieldView™ product line. FieldView™ is a global market leading analysis and visualization tool for large scale CFD. Intelligent Light also performs R&D for the US Department of Energy, Department of Defense, NASA and JAXA, helping to bring the technologies of ultra-scale simulation to the CFD community in the manufacturing industries.

For more information, please contact Prof. Taira at ktaira@seas.ucla.edu

All faculty, students, and guests are welcome to this event.

(Refreshments will be served.)