UCMERCED UNIVERSITY OF CALIFORNIA School of Natural Sciences

APPLIED MATHEMATICS SEMINAR 291

Efficient Solvers and Sparse Discretizations for very High-order Finite Element Methods

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Date: 4/12/19
Time: 3:00 PM
Location: COB1 267

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ABSTRACT

High-order numerical methods promise higher fidelity and more predictive power when compared with traditional low-order methods. Furthermore, many properties of these methods make them well-suited for modern computer architectures. However, the use of these methods also introduces several new challenges. For example, in the time-dependent setting, high-order spatial discretizations can result in severe time step restrictions, motivating the use of implicit solvers. The resulting systems are large and often ill-conditioned, posing a challenge for traditional solvers.

In this talk, I will discuss the development of efficient solvers and preconditioners designed specifically for high-order finite element and discontinuous Galerkin methods. An entropy-stable sparse line-based discretization will be developed to make these methods suitable for use on GPU- and accelerator-based architectures. These methods will then be applied to relevant problems in compressible flow.

BIO:

Will Pazner is the Sidney Fernbach Postdoctoral Fellow at Lawrence Livermore National Laboratory's Center for Applied Scientific Computing. He received his Ph.D. from Brown University in 2018, where he was co-supervised by Prof. Per-Olof Persson and Prof. Chi-Wang Shu. Will was a postdoctoral scholar at UC Berkeley, and is an affiliate of the Mathematics Group at Lawrence Berkeley National Laboratory.