

SCIENTIFIC COMPUTING
SEMINAR

*Metanumerical computing for partial differential equations: the
Sundance project*

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Abstract: Metanumerical computing deals with computer programs that use abstract mathematical structure to manipulate, generate, and/or optimize compute-intensive numerical codes. This idea has gained popularity over the last decade in several areas of scientific computing, including numerical linear algebra, signal processing, and partial differential equations. The Sundance project is such an example, using high-level software-based differentiation of variational forms to automatically produce high-performance finite element implementations, all within a C++ library. In addition to automating the discretization of PDEs by finite elements, recent work is demonstrating how to produce block-structured matrices and streamline the implementation of advanced numerical methods. I will conclude with some examples of this for some incompressible flow problems.

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