

PP106 Minisymposium

SCALABLE FINITE ELEMENT ASSEMBLY

Organizers:

Irina Demeshko

Eric C Cyr

Sandia National Laboratories

Sunday, March 15

4:30 PM - 6:30 PM

Room: 255

PP106 Minisymposium -- Scalable Finite Element Assembly

Partial differential equation (PDE) discretization codes



Computation of matrix/
vector coefficients and
assembly into linear
algebra data structures.
(Finite element assembly)



Numerical linear
algebra including
linear solvers.

?

There is no coherent
strategy for “Assembly”



ScaLAPACK



PP106 Minisymposium -- Scalable Finite Element Assembly

Finite Element Assembly:

- Application specific
-  May require substantial effort to refactor
- Can become a bottleneck: poorly designed abstraction or a careless implementation can result in severe performance penalties.
- ***Minisymposium goal:***
Provide a forum to discuss ideas for developing a portable scalable finite element assembly on modern and next-generation architectures.

PP106 Minisymposium -- Scalable Finite Element Assembly

Architecture Portable Assembly for Maxwell's Equations

Eric C. Cyr, Irina Demeshko, Roger Pawlowski, and Matthew Bettencourt, Sandia National Laboratories, USA

Towards Exascale Implementation of the Finite Element Based Application Development Environment

Irina Demeshko, H. Carter Edwards, Michael Heroux, Roger P. Pawkowsky, Eric Phipps, and Andrew Salinger, Sandia National Laboratories, USA

Multicore Finite Element Assembly Via Scans

Robert C. Kirby, Baylor University, USA

Operator Transformation and Code Generation for Scientific Computing

Andreas Kloeckner, University of Illinois, USA

Occa: A Unified Approach to Multi-Threading Languages

David Medina and Tim Warburton, Rice University, USA; Amik St-Cyr, Shell International Exploration & Production B.V., Netherlands

Assembly Algorithms for Pdes with Uncertain Input Data on Emerging Multicore Architectures

Eric Phipps and H. Carter Edwards, Sandia National Laboratories, USA

Using Multicore Parallelism for Common Finite Element Operations

Bruno Turcksin, Texas A&M University, USA; Martin Kronbichler, Technische Universität München, Germany; Wolfgang Bangerth, Texas A&M University, USA