

Nektar++ Future Topics

Mike Kirby
School of Computing
University of Utah



NEKTAR++

SPECTRAL/HP ELEMENT FRAMEWORK

On the horizon ...

- Exploration of AMG for Solving/Preconditioning (with Hari Sundar, Utah)
 - Algebraic Multigrid with controllable sparsity (mainly for better parallel scalability)

Results To Be Reported At SIAM Annual Meeting _{of}
Boston, MA
July 2016

- Performance is especially good and robust when coupled with PCG.
- When used with PCG, aggressive coarsening can be employed
- Useful for lowering setup and solve costs
- Relatively simple to parallelize - basically the matvec

On the horizon ...

- Making Way For Heterogeneous Architectures
 - Accelerator (GPUs / Intel Phi)
 - Hybrid Computing / co-Processing
- ... Through Updates and Advances
 - C++11
 - Kokkos (Sandia National Lab) / ArrayFire

C++11



- Branch in 2016 (updating as we go) with master update by the start of 2017
- Incorporation of new language features in 2017
 - lambda expressions
 - auto (example — use in iterator)
 - nullptr
 - rvalue referencing (example — matrix copy)
 - standardized memory model
 - threading library



On the horizon ...

- User Support
 - Tutorials (available)
 - User-Guides (available)
 - Developer's Guide (update / ongoing)
- Applications (Solvers)
 - Vector Operations (Solid Mechanics / Electromagnetics)?



Discussion?

Thanks for listening!



NEKTAR++

SPECTRAL/HP ELEMENT FRAMEWORK