

Nek5000 Numerics

Linné FLOW Centre and
Swedish e-Science Research Centre (SeRC),
KTH Mechanics, Stockholm, Sweden





Nek5000 Course

- Idea:
 - Increase our knowledge of the Nek5000 numerics and spectral (element) methods in general.
 - Discuss advanced topics in numerics and HPC.
 - Work towards some "written" Nek tutorial.
 - Maybe in a few years: complete course on advanced CFD.
 - Potential to invite people.
 - "Small" course.



Planned Schedule

- Reading course; intended to give 3.5 ECTS, which is about 2.5 weeks of work.
- Not compulsive! Only come when you have read the papers.
- Summary of the papers plus 4 questions need to be sent 2 days before the meeting to Philipp.
- Each paper should be presented in 15+ slides or blackboard etc.
- Open discussion, and resolution of problems/questions



Planned Schedule

- Already planned:
 - November 11, 13-15: Philipp
 - December 12, 14-16: Jacopo & Mattias

- Suggestions:
 - January 19, 13-15
 - February 16, 13-15
 - March 16, 13-15
 - April 13, 13-15
 - May 18, 13-15
 - June 8, 13-15



Topics (Suggestion)

- Pressure correction method (Blair Perot (2x), Rempfer, Belson): **Jacopo and Mattias**
- Time integration, OIFS, characteristics etc.
- Iterative solvers and projection methods (Fischer 1998)
- Filtering (Fischer&Mullen, Pasquetti, Boyd, Malm, Xu, Mullen&Fischer) and Dealiasing.
- PnPn-2 (Maday&Patera 1990, Fischer 1997)
- PnPn (Tomboulides, Lee & Orszag 1997)
- SEM Multigrid and Preconditioners (Lottes 2005, Ronquist 1992)
- Legendre polynomials + SEM discretisation (Deville App B)
- Interpolation algorithm (code and theory)