

Pointers to Course Information

Introduction

This document contains pointers to information related to this course. It will be regularly up-dated as the semester proceeds. This document is available for download throughout the semester at <https://www.scorec.rpi.edu/~shephard/FEP19/Handouts-2019/info-pointers-2019.pdf>

General handouts -

<https://www.scorec.rpi.edu/~shephard/FEP19/Handouts-2019>

- [course-info-19.pdf](#) - Course information
- CCI-accounts-for-FEP.pdf - Computer account information:
- info-pointers-2019.pdf - This document will be up-dated from time to time

Assignments and information on assignments -

<http://www.scorec.rpi.edu/~shephard/FEP19/Assignments-2019>

- assignments-2019.pdf – the four assignments
- term-project-2019.pdf – document on the term project
- FEP-project-write-up.pdf – document that indicates what is to be included in the term project write-up.

Pointers to information of Software being used in class

- PUMI user's guide - <https://scorec.rpi.edu/~seol/PUMI.pdf>
- Document that will be gone over in class telling you how to get at PUMI for doing your assignments - <https://scorec.rpi.edu/~seol/PUMI-intro.pdf>

Class notes - <http://www.scorec.rpi.edu/~shephard/FEP19/notes-2019>

There will be material added/modified to this as we go along. There will be regular emails indicating when things are added and what will be covered next.

Introductory material – in place for 2019

- Num-Analysis.pdf – introductory material of numerically solving PDE
- FE-Software.pdf
- geometric-modeling.pdf – some background on geometric modeling
- attributes.pdf – some background on attribute specification

Mesh Topology – in place for 2019

- Mesh-nomenclature.pdf – the nomenclature used for meshes
- Mesh-structures-overheads.pdf – overheads on mesh representations

Introduction to Parallel Computing – in place for 2019

- Prallel-collected.pdf

Introduction to MFEM – in place for 2019

- MFEM Overview.pdf – This document overviews the basic technical aspects of MFEM
- ATPESC_2018_KolevShephard.pdf – slides covered in the ATPESC presentation you can find at <https://www.youtube.com/watch?v=Zh6pFjkmr0g&t=2967s> Note that the MFEM material is up to slide 36.

Before the class on January 17th (the MFEM demo/hands-on) you should watch the first 50 minutes of the video.

Note the full set of presentations (slides and videos) for 2018 Argonne Training Program on Extreme Scale Computing (ATPESC) are available at:

<https://extremecomputingtraining.anl.gov/agenda-2018/>

https://www.youtube.com/results?search_query=ATPESC+2018

These lectures include lots of HPC background, state-of-the-art information, and tutorials. For those involved in HPC are encouraged to view videos and presentations of interest to you and your work.

Parallel Mesh Infrastructure *Partly Updated*******

- Pumi-intro.pdf – File contains information on PUMI useful to doing assignments 1-3. Note if there are up-dates during the semester the most current version will be at: <https://scorec.rpi.edu/~seol/PUMI-intro.pdf>
- PUMI-overview-FEP19-6per.pdf – some slides
- PUMI.pdf – PUMI user's guide that gives the PUMI APIs
Note if there are up-dates during the semester the most current version will be at: <https://scorec.rpi.edu/~seol/PUMI.pdf>
- ***** UP TO HERE IN PLACE *****
- Zoltan-overview.pdf
- parma-short.pdf – notes on partition improvement

Ordering and Load Balance ** Partly Uploaded ********

- Efficiency-issues-ordering-all.pdf

Finite Element Analysis – in place for 2019 (2/16/18)

- FEA-review.pdf – notes on form of a basic FE analysis program covered in FE fundamentals.
- FE-Analysis-Simplified.pdf – pseudo code for a classic analysis code
- analysis-handout-all-notes.pdf
- Iterative-solution-methods
- Time-dependent-nonlinear.pdf

Iterative equation solvers *** NOT YET ***

- mgtut.pdf – multigrid tutorial slides

Non-linear solution strategies *** NOT YET ***

Parallel adaptive finite element analysis *** NOT YET ***

- Parallel-fem-example.pdf – PHASTA scaling results
- Parallel-mesh-adapt-gen-2013.pdf

Some background papers are in

<http://www.scorec.rpi.edu/~shephard/FEP19/papers>

Some additional ones may be added as the course proceeds

- TOMS-PUMI.pdf – overview of PUMI
- [seol_shephard_EngComp.pdf](#) - mesh infrastructure
- [beall-mesh.pdf](#) – mesh topology
- Dan-Ibanez-Thesis.pdf – move to array-based structures, version for GPUs, etc.
- Weiler-thesis.pdf – non-manifold geometric model (a thesis)

- Attributes.pdf – paper on analysis attributes
- Beall-mesh-geometry-interact.pdf
- reorder-2010-Zhou.pdf – adjacency reordering

General Information on Parallel Computing

- Parallel programming intro. - https://computing.llnl.gov/tutorials/parallel_comp/
- MPI - <https://computing.llnl.gov/tutorials/mpi/>
- 2018 Argonne Training Program on Extreme Scale Computing (ATPESC) - <https://extremecomputingtraining.anl.gov/agenda-2018/>
https://www.youtube.com/results?search_query=ATPESC+2018
- https://computing.llnl.gov/?set=training&page=index-training_materials - List of available resources, includes OpenMP, TotalView, POSIX thread, etc.