IN THE NAME OF GOD

Dept. of Civil Engineering
University of Tehran

New PhD Course

"Meshless Methods (EFM)"

A 3-Unite PhD Course in Computational Mechanics

http://sfsepehr.i8.com/Sohail/courses.htm#_meshless

lectured by:

S. Mohammadi

S. Forouzan-sepehr

Evaluation:

- Homework ~30%
- Final Exam, Part I: Questions (Closed Book) ~10%
- Final Exam, Part II: Problems (Take Home) ~ 60%

Contents in Brief:

- Introduction
- Preparation to Solve Engineering Problems by the Use of Meshless Methods
- Integration Methods
- Development of Meshless Methods
- Element-Free Galerkin Method
- Meshless Local Petrov-Galerkin Method
- Reproducing Kernel Particle Method
- *hp*-Cloud Meshless Method
- Advanced Topics

Further details about the course are available at: <http://sfsepehr.i8.com/Sohail/courses.htm#_meshless>

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"Meshless Methods (EFM)"

S. Mohammadi, S. Forouzan-sepehr

A 3-Unite PhD Course in Computational Mechanics

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Contents:

1. Introduction
   Outline of the course, a review on general partial differential equations for engineering problems, an overview to computational methods for solving boundary value engineering problems, the idea of meshless methods.
2. Preparation to Solve Engineering Problems by the Use of Meshless Methods
   Modelling of the geometry, node generation, definition of influence domain, a review on principles for weak forms, definition of weight function, meshless methods general procedure, comparison between EFM and FEM.
3. Integration Methods
   Background cells and Gauss points, nodal integration.
4. Development of Meshless Methods
   Point interpolation & approximation methods, "Smoothes Particle Hydrodynamic Approach (SPH)", "Finite Point Method (FPM)", "Finite Volume Method (FVM)", "Moving Least Squares Approximation (MLS)", "Partition of Unity Approach (PUM)", "Reproducing Kernel Particle Method (RKPM)".
5. Element-Free Galerkin Method (EFGM)
   EFG shape function construction, application of EFGM in heat transfer problems, application of EFGM in solid mechanics, nonlinear problems.
6. Meshless Local Petrov-Galerkin Method (MLPG)
   MLPG formulation, application of MLPG in dynamic problems.
7. Reproducing Kernel Particle Method (RKPM)
   RKPM formulation, application of RKPM in computational contact mechanics.
8. *hp*-Cloud Meshless Method
   An overview to adaptive analysis, *hp*-Cloud formulation, application of *hp*-Cloud in computational fracture mechanics.
9. Advanced Topics
   Error estimation in meshless methods, node refinement and renoding, adaptive procedures for meshless methods, coupled methods (EF-FE, EF-BE and EF-BE-FE).

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2. Final Exam, Part I: Questions (Closed Book) ~10%
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Proposed by:

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