Mohammad Vahab

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Education

- **PhD in Structural Engineering (2010-2014)**
  - Department of Civil Engineering, Sharif University of Technology, Tehran, Iran
  - *Thesis :* **Modeling of hydraulic fracturing in fractured saturated porous media using the extended finite element method**
  - *Supervisor*: **Prof. Amir Reza Khoei** (arkhoei@sharif.edu)
  - *Total GPA*: **16.90/20** or (**3.4/4.0**)

- **Master of Science in Structural Engineering (2008-2010)**
  - Department of Civil Engineering, Sharif University of Technology, Tehran, Iran
  - *Thesis :* **Modeling of crack propagation in saturated two phase porous media using X-FEM**
  - *Supervisor*: **Prof. Amir Reza Khoei** (arkhoei@sharif.edu)
  - *Total GPA*: **17.10/20** or (**3.4/4.0**)

- **Bachelor of Science in Structural Engineering (2004-2008)**
  - Department of Civil Engineering, Sharif University of Technology, Tehran, Iran
  - *Total GPA:* **15.66/20** or (**3.2/4.0**)

- **National Diploma in Mathematics and Physics (2000-2004)**
  - Din va Danesh High School, Tehran, Iran.
  - *Total GPA:* **19.81/20** or (**4.0/4.0**)

Research Interests

- ***Computational Continuum Mechanics***

Finite Element Method, Extended Finite Element Method, Mesh Free Method, Boundary Element Method Applications in

- Hydraulic fracturing
- Porous media
- Multi-phase materials
- Large deformational modeling
- Fracture mechanics and crack propagation
- Contact and impact
- Plasticity modeling

- ***Applications of Computational Tools in Analysis and Design***

  Use FEM and other computational programs for structural modeling and design

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Developing new computer programs as well as working on developed programs for studying on such subjects.

Publications

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a. <u>ARTICLES</u>

- A.R. Khoei, **M. Vahab**, E. Haghighat, S. Moallemi (2014) "A mesh-independent finite element formulation for modeling crack growth in saturated porous media based on an enriched–FEM technique". *International Journal of Fracture (DOI 10.1007/s10704-014-9948-2).*
- A. R. Khoei, **M. Vahab** (2014) "A numerical contact algorithm in saturated porous media with the extended finite element method". *Computational Mechanics (DOI 10.1007/s00466-014-1041-1).*
- A. R. Khoei, **M. Vahab**, M. R. Hirmand (2014) "An XFEM implementation of hydraulic fracturing and its interaction with discontinuities" (*submitted to engineering fracture mechanics*).
- A. R. Khoei, S. Moallemi, **M. Vahab**, E. Haghighat (2014) "Extended finite element modeling of non-isothermal fractured saturated porous media" (*under submission*).
- A. R. Khoei, **M. Vahab**, M. R. Hirmand (2014) "The interaction of hydraulic fracturing with natural faults in saturated porous media by using the extended finite element method" (*submitted to Computer Methods in Applied mechanics engineering*).
- A. R. Khoei, **M. Vahab**, H. Ehsaniardestani, M. Rafieerad (2014) "On blending elements in extended finite element modeling of large deformations" (*submitted to Engineering Computations*).

- A. R. Khoei, M. R. Hirmand, **M. Vahab**, M. Bazargan (2014) " Numerical and experimental simulations of cohesive hydraulic fracture propagation in impermeable media with frictional fault" (*submitted to international journal for numerical and analytical methods in engineering*).

b. <u>BOOKS</u>

- **M. Vahab**, H. Jarfi "Mechanics of materials and analyses of structures for PhD entrance exam of civil engineering". *Civil House Publication*, 2013 *(in Persian).*

- **M. Vahab** "Translation of Structural Impact book by N. Jones" *Malek Ashtar university press*, 2013 *(in Persian.)*

- Acknowledged for provision of three first chapters of a book titled "XFEM: the theory and applications", which is a text book provided by A. R. Khoei for John Wiley publications (*final revisions before publication*).

Research Experiences

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1. XFEM analysis of Saturated Porous Media

- *Crack propagation in porous media*
- *Hydraulic fracturing*
- *Interaction between cracks*
- *Bi-material modeling of saturated porous media*
- *Consolidation problem*
- *Contact*

2. Finite Element Toolbox developed in MATLAB

This toolbox contain a lot of features in linear and nonlinear modeling of one and two dimensional elements with finite element method

- *Nonlinear large deformational modeling in Total and Updated Lagrangian formulation*
- *Plasticity modeling of solids*
- *Dynamic contact modeling on inclined surfaces*
- *Large rotational modeling of solid disc in Total Lagrangian and Updated Lagrangian formulation*
- *Error estimation and Mesh generator*

3. Other Projects

- *Design of more than 50 concrete or steel structures by ETABS and SAP*
- *Design of footings by SAFE*

Work Experiences

- Member of Structural Building Company, Sahandsaze Engineer Construction CO, Tehran, Iran.
- Member of Structural Building Company, Ivan Engineer Construction CO, Tehran, Iran.
- Member of Structural Building Company, Atisaz Engineer Construction CO, Tehran, Iran.

Teaching

- Lecturer
    - "Statics" - *Sharif University of Technology, International branch, 2014.*
    - "Mechanics of materials lab" - *Sharif University of Technology, International branch, 2013.*
    - "Civil engineering Olympiad" - *Iran University of Science and Industry, 2013.*
    - "Mechanics of materials" – *Oxin institute of higher education, 2012-2013.*
    - "Analyses of structures" – *Oxin institute of higher education, 2012-2013.*
    - "Design of steel structures" – *Sanjesh takmili institute of higher education, 2011.*

Courses

- **PhD.**
  Continuum mechanics, Fracture mechanics, Theory of plates and shells, Fracture – Fatigue – Creep, Control of structures, Theory of plasticity.
- **M. Sc.**
  Finite element method, finite element method 2, Theory of elasticity, Advanced engineering mathematics, Multiphase flow, Vibration of structures, Numerical methods for structural analyses, LRFD steel design, Steel bridge design.

Awards and Honors

- *Placed **202** among nearly **500,000** participants, in the national University entrance exam (2004)*
- *Ranked **1** between over participants, in the nationwide entrance examination for M.Sc. degree in civil engineering among more than **30,000** civil engineers (2008).*
- *Awarded with **bronze medal** in scientific Olympiad university students of Iran (2008).*
- *Third grade certification for supervision of building construction, PE (2013).*

Computer skills

- Programming Languages:
  FORTRAN (professional), *PASCAL* (professional)
- Numerical Analysis Software

MATLAB (professional), *Maple* (intermediate)

- FEM Tools
  ETABS (professional), *SAP 2000* (professional), *SAFE* (professional)
- Others
  Microsoft Office, AutoCAD, Tecplot, GID

Language

- Persian : *Native Language*
- English : *Fluent*

References

Dr. Amir Reza Khoei (ARKhoei@sharif.edu), Professor, Department of Civil Engineering, Sharif University of Technology, Tehran, Iran.
Dr. Omid Reza Barani (Barani@kntu.ac.ir), Assistant Professor, Department of Civil Engineering, Khaje Nasir Toosi University, Tehran, Iran.
Dr. Mohammad Taghi Kazemi (Kazemi@sharif.edu), Associate Professor, Department of Civil Engineering, Sharif University of Technology, Tehran, Iran.