Danial Faghihi

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EDUCATION

2008-present **Ph.D. (Civil Engineering/Structural Engineering & Mechanics)**
Minor in Mechanical Engineering/Material Science
Louisiana State University, Baton Rouge, Louisiana, USA

Dissertation: CONTINUM AND CRYSTAL STAIN GRADIENT PLASTICITY WITH ENERGETIC AND DISSIPATIVE LENGTH SCALES

Research work:

- Developing a thermodynamically consistent gradient formulation to account for temperature and strain rate using physically based viscoplastic constitutive models for different metal structure (e.g. FCC, BCC, metal alloys);
- Investigating possible use of the gradient theory to account for the mechanical and thermal behavior of micro-manufactures such as thin films;
- Implementing the gradient enhanced plasticity model into a 3D finite element code (ABAQUS/VUMAT);
- Analyzing the localized problems such as shear bands as well as modeling of strengthening and softening in inelastic nano-crystalline materials using the FE code;
- Determining the material intrinsic length scale which accounts for temperature, strain rate, plastic strain and grain size using nano-indentation size effect.

Advisor: Professor George Z. Voyiadjis
GPA: 4.0
Expect Graduation: August 2012

2005-2007 **MS.c. (Civil Engineering/Geotechnical engineering)**
Sharif University of Technology, Tehran, Iran

Thesis: NUMERICAL MODELING OF THE FIRST IMPOUNDING OF ROCKFILL DAMS (CASE STUDY: TALEGHAN DAM)
Advisor: Professor S.M. Haeri
GPA: 3.8

2001-2005 **BS.c. (Civil Engineering)**
Khaje Nasir University of Technology (University of Science and Technology, KNTU), Tehran, Iran.

Graduation Project: STRUCTURAL ANALYSIS AND DESIGN OF STEEL AND REINFORCED CONCRETE BUILDINGS
GPA: 3.1

RESEARCH INTERESTS:

- Multi-scale theoretical and computational solid and structural mechanics;
- Nonlocal and strain gradient theories;
- Size effects at the micron, submicron, and nano-scales;
- Micromechanical-based viscoplastic constitutive and computational models for metals and metal alloys.
- Computational mechanics and geomechanics
- Transient effects in porous media and coupled analyses.

PROFESSIONAL EXPERIENCE:

2010- Present **Research Assistant and Laboratory Coordinator**

Advanced Computational Solid Mechanics Laboratory, Civil & Environmental Engineering Department, Louisiana State University, Baton Rouge, LA.

Research assistant on the following projects:

- "Integral Abutment Bridge for Louisiana's Soft and Stiff Soils: Caminda Bay Bridge"

  Sponsored by Louisiana Department of Transportation and Development, Baton Rouge, LA

  Conducted in Cooperation with the U.S. Department of Transportation, Federal Highway Administration
- "LA 160 Integral Abutment Bridges: Bodcau Bayou Bridge"

  Sponsored by Louisiana Department of Transportation and Development, Baton Rouge, LA

  Conducted in Cooperation with the U.S. Department of Transportation, Federal Highway Administration

Coordinated the following facilities at the Advanced Computational Solid Mechanics Laboratory (CSM lab):

- A network of Pentium-based PC's as well as Silicon Graphics and Digital Unix workstations.
- Microway's Beowulf type distributed computing system and Athlon cluster.
- CSM lab web page.

2008- Present **Teaching Assistant**

Advanced Computational Solid Mechanics Laboratory, Civil & Environmental Engineering Department, Louisiana State University, Baton Rouge, LA.

Teaching Assistant for the following classes taught at the Civil and Environmental Engineering Department:

- Vector Mechanics (Statics)
- Mechanics of Materials
- Plasticity of Structural Engineering (graduate course)
- Solid Mechanics (graduate course)

2006- 2008 **Research Assistant**

Civil & Environmental Engineering Department, Sharif University of Technology, Tehran, Iran.

Collaborated on the following research project:

- "Investigating the effect of the first impounding on the behavior of the Taleghan dam"

  sponsored by: Ministry of Energy, IRAN.

2003- 2006 **Practical Engineering**

Role in design and construction of various structures in the following companies:

- Padiz Bon, Tehran, Iran: Geotechnical Engineer.
- Fars Sazan Gostar, Pin , and Asar, Tehran, Iran: Design of various steel and concrete structures.
- Teha Kish Company, Kish Island, Iran: Congress Center of Kish Island.

PUBLICATIONS:

Journal Publications:

- **Faghihi, D.**, and Voyiadjis, G. Z. (2011); Determination of Nanoindentation Size Effects and Variable Material Intrinsic Length Scale for body-centered cubic Metals. Mechanics of Materials.
- **Faghihi, D.,** and Voyiadjis, G. Z. (2011); Size effect and length scales in nanoindentation for bcc materials with application to Iron. Proc. IMechE Vol. 225 Part N: Journal of Nanoengineering and Nanosystems
- Voyiadjis, G. Z., **Faghihi, D.**, and Zhang, C. (2011); Analytical and Experimental determination of rate, and temperature dependent length scales using nanoindentation experiments. Journal of Nanomechanics and Micromechanics (ASCE).
- Voyiadjis, G. Z., and **Faghihi, D.** (2011); Variable Material Intrinsic Length Scale for FCC Metals Using Nano-Indentation. Proc. IMechE Vol. 224 Part N: Journal of Nanoengineering and Nanosystems
- Voyiadjis, G. Z., Deliktas, B., **Faghihi, D.** and Lodygowski, A. (2010); Friction coefficient evaluation using physically based viscoplasticity model at the contact region during high velocity sliding. Acta Mechanica.
- Voyiadjis, G. Z., and **Faghihi, D.** (in review); Thermo-Mechanical Strain Gradient Plasticity with Energetic and Dissipative Length Scales. International Journal of Plasticity.
- **Faghihi, D.,** and Voyiadjis, G. Z. (Under preparation); Thermomechanical Responses of the Plastic Deformation for BCC Metals using strain gradient plasticity. Planned to send to: Journal of the Mechanics and Physics of Solids
- Haeri, S.M. and **Faghihi, D.,** (in review); Investigation of Hydraulic Fracturing in a Case Study Earth Dam during First Impounding. International Journal of Geotechnical Engineering
- **Faghihi, D.,** and Haeri, S.M. (in review); A numerical Study on the Behavior of the Rock-fill Dams During First Impounding Process International Journal for Numerical and Analytical Methods in Geomechanics

Conference papers:

- Voyiadjis, G.Z. and **Faghihi, D.** "Gradient Plasticity with Temperature and Rate Dependent", ASME 2011 International Mechanical Engineering Congress & Exposition - Aug. 2011.
- Haeri, S., **Faghihi, D.** "Modeling the construction process of a case study earthdam using finite element methods"; Proceedings of the 17th International Conference on Soil Mechanics and Geotechnical Engineering (ICSMGE 2009), Alexandria, Egypt – Oct 2009
- Haeri, S., **Faghihi, D.** "Study on the behavior of earth dam during impounding process - Case study:Taleghan Dam"; Amirkabir Journal of Science & Technology - 2009.
- Jafarzade, F., **Faghihi, D.**, Ehsani, M. "Numerical Simulation of Shaking Table Tests on Dynamic Response of Dry Sand"; 14th World Conference on Earthquake Engineering , China - Oct. 2008.
- Haeri, S., **Faghihi, D.** , Predicting Hydraulic Fracturing in Hytejuvet Dam; 6th International Conference on Case Histories in Geotechnical Engineering and Symposium in Honor of Professor James K. Mitchell – University of Missouri (USA)- Aug 2008
- Haeri, S., **Faghihi, D.**, Study on the behavior of earth dam during construction process; 4th national conference of civil engineering – University of Tehran (Iran) - May 2008

Research reports:

- Voyiadjis, G.Z., Cai , S., Alshibly, K., **Faghihi, D.**, Integral Abutment Bridge for Louisiana's Soft and Stiff Soils: Caminda Bay Bridge; Report submitted to Louisiana Transportation Research Center (LTRC), Baton Rouge, LA - 2011.
- Haeri, S.M., **Faghihi, D.,** Investigating the effect of the first impounding on the behavior of the Taleghan dam; Report submitted to Ministry of Energy of Iran, Tehran, IRAN - 2008.

Presentations:

- Voyiadjis, G. Z., and **Faghihi, D.**, "Gradient Plasticity with Temperature, Grain Size and Rate Dependent Length Scales." Invited lecture presented at the Symposium on Multiscale Behavior of Damage and Failure Mechanics, Conference of the Engineering Mechanics Institute 2011 (EMI 2011), Northeastern University, Boston, Massachusetts, June 2011
- Voyiadjis, G. Z., and **Faghihi, D.**, "Microstructure to Macro-scale using Gradient Plasticity with Temperature and Rate Dependent Length Scales." Invited Keynote lecture presented at the International Union of Theoretical and Applied Mechanics (IUTAM) Symposium on Linking Scales in Computations: from Microstructure to Macro-scale Properties, Pensacola, Florida, May 2011.
- Voyiadjis, G. Z., and **Faghihi, D.**, "Analytical and Experimental Determination of Rate and Temperature Dependent Length Scales Using Nanoindentation." Invited Keynote lecture presented at the "Mini-symposium on Deformation and Failure at Micro and Nano Scales in honor of Professor W. Nix," The 17th International Symposium on Plasticity & Its Current Applications, Puerto Vallarta, Mexico, January 2011.
- Voyiadjis, G. Z., Deliktas, B., **Faghihi, D.**, and Lodygowski, A., "Multiscale Physical Model for Friction and Wear in Metals Using Gradient Based Damage Coupled Viscoplasticity." Invited Speaker presented at the Symposium on "Multiscale Modeling of Micro/Nano Structural Thin Films," of the ASME International Mechanical Engineering Congress and Exposition, Vancouver, Canada, November 2010.
- Voyiadjis, G. Z., and **Faghihi, D.**, "Multiscale Physical Model for Friction and Wear in Metals Using Gradient Based Damage Coupled Viscoplasticity." Invited lecture presented at the Symposium on "Damage and Fracture Characterization of Engineering Materials," of the ASME International Mechanical Engineering Congress and Exposition, Vancouver, Canada, November 2010.
- Voyiadjis, G. Z., and **Faghihi, D** "Materials and Structures under Extreme Loadings: Coupled Viscoplastic Damage Model for Hypervelocity Impact in Metals & Composites." Invited lecture presented at Center of Materials, College of Engineering, School of Mechanical Engineering, Hanyang University, Seoul, Republic of Korea, April 2011.
- **Faghihi, D.**, Voyiadjis, G.Z., "Thermo-Viscoplastic Deformation of Steel Alloys" Graduate Student Research Conference, Louisiana Tansportation Research Center (LTRC), Baton Rouge, LA, Apr. 2011
- Voyiadjis, G.Z., **Faghihi, D.** "Temperature, Rate, and Grain Size Effects in Nano-Indentation, and Material Intrinsic Length Scale" International Symposium on Plasticity and Its Current Applications, Vallarta, Mexico - Jan. 2011
- **Faghihi, D.**, Voyiadjis, G.Z., "Characterization of Material Behavior from Microstructure to Macro-scale with Variable Length Scales" Graduate seminar, Department of Civil and Environmental Engineering, Louisiana State University, Baton Rouge, LA - Jan. 2011
- **Faghihi, D.**, Haeri, S.M. "Study on the behavior of earth dam during construction process"; 4th national conference of civil engineering – University of Tehran (Iran) - May 2008
- **Faghihi, D.**, Haeri, S.M. "Numerical Modeling of the First Impounding of Rockfill Dams with emphasis on Hydraulic Fracturing of Core and Collapse of U/S Shell", Graduate seminar, Sharif University of Technology, Tehran, Iran – Apr 2006.
- **Faghihi, D.** "Numerical Analysis of Deep Foundation with emphasis on Contact Elements". Sharif University of Technology , Tehran, Iran – Jun 2006
- **Faghihi, D.**, Haeri, S.M. "Earth Dams on Liquefiable Foundation (centrifuge experimental studies and numerical analyses)" Sharif University of Technology , Tehran, Iran – Jun 2006
- **Faghihi, D.**, Pak, A. "Transport of crude Oil in Unsaturated Soil" Sharif University of Technology , Tehran, Iran – Apr 2006
- **Faghihi, D.**, Jafarzade, F. "Investigation of dynamic properties of soil using physical model test on shaking table". Sharif University of Technology , Tehran, Iran – Jan 2006

COMPUTER AND SOFTWARE SKILLS:

Finite Element:	ABAQUS, ANSYS
Programming:	Fortran, MATLAB, Maple, Mathcad
High-Performance Computing:	Familiar with the basics of Linux-based HPC cluster administration
Structural and Soil Analysis:	PLAXIS , GEO-STUDIO, GEOSOLVE-SLOP, FLAC, SAP-2000, ETABS-2000, SAFE
Engineering Drawing:	AutoCAD, Adobe Photoshop, SolidWork, DraftSight
Office Tools:	MS-Office (Word, Excel, PowerPoint, Access, Front Page), Adobe Acrobat
Earthquake site Response:	NERA, EERA, SHAKE

Graduate level courses:

- Plasticity of Structural Engineering
- Solid Mechanics
- Mechanics of Composite Materials
- Damage Mechanics
- Finite Element Method for Solids
- Advanced Finite Element Method
- Deformation and Fracture of Materials
- Kinetics of Materials
- Advanced Numerical Analysis
- Partial Differential Equations
- Nonlocal Theory and Multi-scale Modeling
- Mechanical Behavior of Materials
- Thermodynamics of Materials
- Advance Engineering Mathematics
- Numerical Methods in Geomechanics
- Advance Numerical Methods in Geomechanics
- Advance Soil Mechanics
- Soil Dynamic
- Advance Foundation Engineering
- Earth Dams and Project
- Environmental Geotechnics
- High Performance Computing (workshops)

AWARDS AND DISTINCTIONS

- First ranked oral presentation in Graduate Student Research Conference, LSU, April. 2011
- PhD. Graduate Student Assistantship from Louisiana State University, GPA is 4.0. 2008-present.
- Second ranked graduate student (M.S in Geotechnical Engineering) of Civil Engineering Department, Sharif University of Technology, Tehran Iran, 2007.
- Ranked 42th among more than 25000 competent in national MSc entrance exam of IRAN, 2005.

SOCIETY MEMBERSHIP:

- American Society of Civil Engineering (ASCE).
- American Society of Mechanical Engineering (ASME).
- American Concrete Institute (ACI).