

Mohsen Dadfarnia, Ph.D.

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EDUCATION

University of Illinois, Urbana-Champaign, IL

PhD in Mechanical Engineering, GPA: 4.0 / 4.0

Dissertation: Micromechanics of Hydrogen-Induced Crack Initiation in Pipeline Steels and Subcritical Crack Growth

Mar. 2009

Clemson University, Clemson, SC

Master of Science in Mechanical Eng

- Investigation of hydrogen embrittlement of a lath martensitic steel using

- Solid Mechanics II (TAM552, graduate level) Springs of 2010, 2011, 2012, 2013, 2014, 2015
- Fracture Mechanics (TAM555, graduate level) Falls of 2010 and 2014
 - Jointly taught courses with Prof. Sofronis

Teaching Assistant

Department of Mechanical Science and Engineering, University of Illinois

- Mechanical Design II (ME371, undergraduate class) Spring 2004
 - Instructed two sections of computer labs and evaluated/corrected lab reports
- Modeling and Analysis of Dynamic Systems (ME340, undergraduate class) Fall 2003
 - Instructed a lab section of the class and graded lab reports
 - Organized class hours for students and prepared homework solutions

Teaching Assistant

Department of Mechanical Engineering, Clemson University

- Calculus of One Variable (introductory undergraduate class) Summer 2003
 - Held problem sessions and helped instructor with in-class student assignments/discussions
- Advanced Control Engineering (graduate level) Spring 2003
 - Prepared homework solutions and graded homework
- Introduction to Dynamic Systems (undergraduate class) Spring 2003
 - Prepared homework solutions and graded homework

Teaching Assistant

Department of Mechanical Engineering, Sharif University of Technology

- Machine Design II (undergraduate class) Spring 1998
 - Held problem sessions and supervised students on their course projects
- Continuum Mechanics (graduate level) Fall 1997
 - Graded homework and held office hours

Advising Experience

Co-advised students in Professor Sofronis group

- Kshitij Vijayvargia (Ph.D. student) Aug. 2019 – present
- Zahra Hosseini (Ph.D. student) Aug. 2020 – Feb. 2022
- Rupesh K. Mahendran (M.S. student) Aug. 2018 – Aug. 2020
- Zahra Hosseini (Ph.D. student) Aug. 2013 – May 2020
- John W. Sanders (Ph.D. student) Aug. 2013 – June 2017
- Will Enowmbitang (undergraduate) Spring 2017
- Ziwei Che (M.S. student) Aug. 2015 – Aug. 2017
- Rah He (M.S. student) Spring 2015
- Jason J. Chan (M.S. student) Jan. 2010 – Dec. 2011
- Kuntay Kucukal (M.S. student) Aug. 2009 – Aug. 2011
- Gregory J. Schebler (M.S. student) Jan. 2010 – Dec. 2010
 - Taught use of ABAQUS software, formulation of constitutive material models based on finite-deformation finite element and analysis, and writing user material subroutines (UMAT)
 - Helped the students with code writing
 - Guided the students in their research

COMPUTER SKILLS

Software packages: Abaqus, ANSYS, SolidWorks, Matlab/Simulink, Maple, and Mathematica

Programming languages: Fortran, C++, and Python

Platforms: Windows and UNIX

Office software: Microsoft Office (Word, PowerPoint,

INDUSTRIAL EXPERIENCE

Team member in the following projects

Evolution of stress and strains in hydrogen sensor

Summer of 2019

- Supported by Nagano Keiki Co., LTD

- Performed numerical simulation for determining the impact of pressure sensor exposure on strains developed on the pressure sensor diaphragm

A combined micromechanics/materials-science approach to hydrogen attack in carbon steels

- Supported by BP-ICAM

- Reviewed the existing literature on high temperature hydrogen attack (HTHA)
- Proposed a physically-based lifetime prediction model for failure of carbon steels under HTHA

Evaluating hydrogen embrittlement of line pipe steels

Sep. 2015 – Sep. 2016

- Supported by Southern California Gas (SoCalGas) Company

- Analyzed growth of axial crack under cyclic loading in pipelines due to random fluctuation of internal pressure

Martin, M.L., **Dadfarnia, M.**, Nagao, A., Wang, S., Sofronis, P., 2019, "Enumeration of the hydrogen-enhanced localized plasticity mechanism for hydrogen embrittlement in structural materials," *Acta Materialia*, 165, pp. 734-750. (DOI: 10.1016/j.actamat.2018.12.014)

Hosseini, Z.S., **Dadfarnia, M.**, Somerday, B.P., Sofronis, P., Ritchie, R.O., 2018, "On the Theoretical Modeling of Fatigue Crack Growth," *Journal of the Mechanics and Physics of Solids*, 121, pp. 341-362. (DOI: 10.1016/j.jmps.2018.07.026)

Nagao, A., **Dadfarnia, M.**, Somerday, B.P., Sofronis, P., and Ritchie, R.O., 2018, "Hydroge

Dadfarnia, M., Somerday, B.P., Sofronis, P.

Environments, B. P. Somerday, and P. Sofronis, eds., ASME Press, New York, NY, Proceedings of the 2016 International Hydrogen Conference, Grand Teton National Park, Wyoming, September 11-14, 2016, pp. 71-80.

Nagao, A., Wang, S., Nygren, K.E., **Dadfarnia, M.**, Sofronis, P., and Robertson, I.M., 2017, "Microstructural

Dadfarnia, M., Sofronis, P., Robertson, I.M., Somerday, B.P., Muralidharan, G., and Stalheim, D., 2007, "Numerical Simulation of Hydrogen Transport at a Crack Tip in a Pipeline steel," *Proceedings of the 6th*

“A Methodology for Studying Hydrogen Embrittlement in a Steel Pipeline”, *45th Annual Technical Meeting, Society of Engineering Science (SES 2008)*, Urbana, Illinois, October 12-15, 2008.

“Modeling Hydrogen-Induced Sustained-load Cracking by Intergranular Failure”, *2008 International Hydrogen Conference: Effect of Hydrogen on Materials*, Grand Teton National Park, Wyoming, September 7-10, 2008.

“Hydrogen/Plasticity Interaction at Internal Cracks in Pipeline Steels”, *7th International ASTM/ESIS Symposium on Fatigue and Fracture*, Tampa, Florida, November 14-16, 2007.

“Micromechanics of Hydrogen Transport and Embrittlement in Pipeline Steel” *International Mechanical Engineering Congress and Exposition (06)*, Chicago, Illinois, November 5-10, 2006.

“A Reduced-order Observer based Piezoelectric Control of Flexible Cartesian Robot Manipulator,” *International Mechanical Engineering Congress and Exposition (02)*, New Orleans, Louisiana, November 17-22, 2002.

Reports:

Dadfarnia, M. and Sofronis, P. 2016, “Assessment of Resistance of Line Pipe Steels to Hydrogen Embrittlement” Report for Southern California Gas (SoCalGas) Company

Sofronis, P., Dadfarnia, M., and Martin, M.L., 2016, “Critical Review of High Temperature Hydrogen Attack in Carbon Steels” Report for BP-ICAM Project

Dadfarnia, M., Sofronis, P., and Robertson, I. M., 2012, “Irradiation Effects on Material Properties for 304L Stainless Steel Base Metal and Welds