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Education

2008-2014 LOUISIANA STATE UNIVERSITY

Ph.D. Mechanical Engineering

Dissertation: “[Applications of the variational approach to fracture mechanics](#)” (Advisor: *Prof. B. Bourdin*, Coadvisor: *Prof. M. Khonsari*).

2008-2014 LOUISIANA STATE UNIVERSITY

M.Sc. Applied Mathematics

Thesis: “Work controlled formulation for abrupt fracture in variational approach to fracture mechanics” (Advisor: *Prof. B. Bourdin*).

2005–2007 AMIRKABIR UNIVERSITY OF TECHNOLOGY (TEHRAN,IRAN)

M.Sc. Mechanical Engineering (Solid Mechanics), Dec 2007

Thesis: “Constitutive equation for high temperature plasticity”. (Advisor *Prof. M.R. Eslami*)

2001–2005 ISLAMIC AZAD UNIVERSITY, CENTRAL TEHRAN BRANCH (TEHRAN,IRAN)

B.Sc. Mechanical Engineering (Solid Mechanics), Aug 2005

Publications and Periprints ([Google Scholar](#))

- “On the tribological behavior of MoS_2 coated thrust ball bearings operating under oscillating motion”
A. Mesgarnejad, M.M. Khonsari
Wear, 2010, Volume 269, Issues 7–8, 547–556.
- “A variational approach to the fracture of brittle thin films subject to out-of-plane loading”
A. Mesgarnejad, B. Bourdin, M. Khonsari
Journal of Mechanics and Physics of Solids, 2013, Volume 61, Issue 11, 2360-2379.

- “Validation simulations for the variational approach to fracture mechanics” [Publications and Periprints](#)
A. Mesgarnejad, B. Bourdin, M. Khonsari
Journal of Computer Methods in Applied Mechanics and Engineering, 2015, Volume 290, 420-437.
- “Phase-Field Models for Fatigue Crack Growth”
A. Mesgarnejad, A. Imanian, A. Karma
Journal of Theoretical and Applied Fracture Mechanics, 2019, 102282.
- “Crack Path Selection in Orientationally Ordered Composites”
A. Mesgarnejad, C. Pan, R.M. Erb, S.J. Shefelbine, A. Karma
Submitted to Composites B, [arXiv:1811.05891](#).
- “Phase Field Modeling of Chemomechanical Fracture of Intercalation Electrodes: Role of Charging Rate and Dimensionality”
A. Mesgarnejad, A. Karma
Submitted to Journal of Mechanics and Physics of Solids, [arXiv:1906.07655](#).
- “Vulnerable Window of Yield Strength for Swelling-Driven Fracture of Phase-Transforming Battery Materials”
A. Mesgarnejad, A. Karma.
Submitted to ACS Nano Letters, [arXiv:1908.02175](#).

Manuscripts Under Prepration

- “Role of System Size in Crack Kinking”
A. Mesgarnejad, A. Karma.

Conference Proceedings

- “Constitutive relation for high temperature cyclic plasticity”
A. Mesgarnejad, M. Sabbaghian, M.R. Eslami
Proceedings of 7th International Congress on Thermal Stresses, Taiwan.
- “Online coated ball bearing health monitoring using degree of randomness and Hidden Markov Model”
Bo Ling, M.M. Khonsari, A. Mesgarnejad, R. Hathaway
Proceedings of IEEE Aerospace Conference, 2009, Big Sky, Montana.

Research Experience

2008–2009 Research Assistant, Mechanical Engineering Department, Louisiana State University
Was in the primary researcher in charge of experiments and reports for a project funded by NASA to design and test a prognosis and diagnosis system for thrust bearings with MoS₂ coating.

- 2010–2014 Research Assistant, Mechanical Engineering Department, Louisiana State University
Worked on several projects on thin-film fracture (funded by NSF), fracture of down well rock bores (funded by Chevron), and sensitivity analysis of double torsion tests (funded by Corning Inc). Also, developed two parallel computer programs (FE, FD) using packages **PETSc**, **libMesh** as backbones to simulate fracture in two and three-dimensional elastic bodies as well as thin films (These codes are hosted on Bitbucket and can be given permission to if found interesting).
- January-June 2015 Postdoctoral research associate, Center for Computation & Technology, Louisiana State University
Continued research on brittle fracture using self-developed FE package. Added HDF5 output in mesh numbering to **PETSc**.
- July-2015– Postdoctoral research associate, Center for Inter-Disciplinary Research in Complex Systems, Department of Physics, Northeastern University
I am the leading researcher in charge of theoretical development and numerical implementation of several projects including Fracture of Li-ion batteries (funded by the Office of Basic Energy Sciences, DOE), fracture of heterogeneous biomimetic materials (funded by NSF in collaboration with S.J. Shefelbine and R. Erb in MIE), phase-field models of fatigue crack propagation (STTR grant with TDA Inc. funded by US Navy Office of Small Business Programs). I have also contributed to the preparation and writing of the grant proposals that were awarded by the DOE and US Navy.

Teaching Experience

- 2008–2009 Research Assistant, Mechanical Engineering Department, Louisiana State University
Thought machine design lab, dynamics, and thermodynamics.

Research Interests

Computational Solid Mechanics with focus on high-performance computing.
Theoretical solid mechanics: fracture mechanics, theory of elasticity, theory of plasticity,...
Finite element analysis.
Functional analysis, partial differential equations.

Grants and Awards

- 1.43 MSUs (\simeq \$77k) on XSEDE through grant MSS160013.