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Elham Mirkoohi, Ph.D.

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Professional Profile

Dr. Mirkoohi applies her expertise in advanced manufacturing, materials science, mechanical engineering, modeling and simulation, failure analysis, and root cause analysis to solve complex, multi-disciplinary engineering challenges across a range of industries. She has supported clients in matters involving product failure investigations, defect mitigation, manufacturing process failure, and root cause analysis. Her experience spans across aerospace, automotive, medical devices, defense, and industrial manufacturing, with a particular focus on the integration of artificial intelligence and computational modeling in engineering solutions.

Dr. Mirkoohi specializes in failure analysis and root cause determination of critical mechanical components, including bearings, gears, and propellers She has extensive experience investigating electrically induced bearing damage, gear failures, and propeller fatigue, and utilizes detailed modeling and simulation to assess failure mechanisms and material behavior. Her expertise also extends to additive manufacturing, where she analyzes process-structure-property relationships to improve material performance and manufacturing reliability.

As a consultant, Dr. Mirkoohi applies computational modeling, AI-driven predictive maintenance, and physics-based simulations to identify and understand the causes of mechanical and material failures. Her work focuses on realizing failure mechanisms, diagnosing defects, and assessing structural integrity to support clients in failure prevention and risk mitigation. She is well-versed in industry standards and regulations, helping clients assess compliance with manufacturing best practices and forensic engineering evaluations.

Dr. Mirkoohi’s expertise in failure analysis, materials processing, and advanced simulation enables her to provide targeted engineering solutions to complex real-world problems. She has contributed to high-profile projects involving additive manufacturing qualification, defect assessment, and AI-enhanced modeling for predictive failure analysis. Her research-driven approach provides data-backed insights to enhance the safety, reliability, and efficiency of products and processes.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Georgia Institute of Technology, 2020

M.Sc., Mechanical Engineering, Oregon State University, 2017

B.Sc., Mechanical Engineering, University of Tehran, 2015

SME Young Manufacturing Engineer Award, 2025

Academic Appointments

Assistant Professor, Mechanical Engineering, Auburn University, 2021-2024

Prior Experience

Assistant Professor, Auburn University, 2021-2024

Postdoctoral Research Fellow, Georgia Institute of Technology, 2020-2021

Executive Coordinator, Novelis Innovation Hub, Georgia Institute of Technology, 2021-2021

Graduate Research Assistant, Georgia Institute of Technology, 2017-2020

Mechanical Design Intern, Tesla, 2019

Graduate Research Assistant, Boeing, 2017-2020

Graduate Research Assistant, Oregon State University, 2015-2017

Undergraduate Research Assistant, University of Tehran, 2011-2015

Professional Affiliations

ASME since 2016

SME since 2026

Publications

Mirkoohi, E., Li, D., Garmestani, H. and Liang, S.Y., 2021. Residual Stress Modeling Considering Microstructure Evolution in Metal Additive Manufacturing. Journal of Manufacturing Processes, 68, pp.383-397.

Mirkoohi, E., Tran, H.C., Lo, Y.L., Chang, Y.C., Lin, H.Y. and Liang, S.Y., 2021. Mechanics Modeling of Residual Stress Considering Effect of Preheating in Laser Powder Bed Fusion. Journal of Manufacturing and Materials Processing, 5(2), p.46.

Mirkoohi, E., Mahdavi, M., Li, D., Garmestani, H. and Liang, S.Y., 2021. Microstructure affected residual stress prediction based on mechanical threshold stress indirect metal deposition of Ti-6Al-4 V. The International Journal of Advanced Manufacturing Technology, 112(5), pp.1705-1712.

Mirkoohi, E., Li, D., Garmestani, H. and Liang, S.Y., 2020. Analytical Modeling of Residual Stress in Laser Powder Bed Fusion Considering Volume Conservation in Plastic Deformation. Modelling, 1(2), pp.242-259.

Mirkoohi, E., Dobbs, J.R. and Liang, S.Y., 2020. Analytical mechanics modeling of in-process thermal stress distribution in metal additive manufacturing. Journal of Manufacturing Processes, 58, pp.41-54.

Mirkoohi, E., Tran, H.C., Lo, Y.L., Chang, Y.C., Lin, H.Y. and Liang, S.Y., 2020. Analytical mechanics modeling of residual stress in laser powder bed considering flow hardening and softening. The International Journal of Advanced Manufacturing Technology, 107(9), pp.4159-4172.

Mirkoohi, E., Tran, H.C., Lo, Y.L., Chang, Y.C., Lin, H.Y. and Liang, S.Y., 2020. Analytical modeling of residual stress in laser powder bed fusion considering part's boundary condition. Crystals, 10(4), p.337.

Mahdavi, M., Mirkoohi, E., Hoar, E., Liang, S. and Garmestani, H., 2020. Prediction of the deformation behavior of a selective laser-melted Ti-6Al-4V alloy as a function of process parameters. The International Journal of Advanced Manufacturing Technology, 107(9), pp.4069-4076.

Mirkoohi, E., Sievers, D.E., Garmestani, H. and Liang, S.Y., 2020. Thermo-mechanical modeling of thermal stress in metal additive manufacturing considering elastoplastic hardening. CIRP Journal of Manufacturing Science and Technology, 28, pp.52-67.

Mirkoohi, E., Dobbs, J.R. and Liang, S.Y., 2020. Analytical modeling of residual stress in direct metal deposition considering scan strategy. The International Journal of Advanced Manufacturing Technology, 106(9), pp.4105-4121.

Ji, X., Mirkoohi, E., Ning, J. and Liang, S.Y., 2020. Analytical modeling of post-printing grain size in metal additive manufacturing. Optics and Lasers in Engineering, 124, p.105805.

Mirkoohi, E., Sievers, D.E., Garmestani, H., Chiang, K. and Liang, S.Y., 2019. Three-dimensional semi-elliptical modeling of melt pool geometry considering hatch spacing and time spacing in metal additive manufacturing. Journal of Manufacturing Processes, 45, pp.532-543.

Ning, J., Mirkoohi, E., Dong, Y., Sievers, D.E., Garmestani, H. and Liang, S.Y., 2019. Analytical modeling of 3D temperature distribution in selective laser melting of Ti-6Al-4V considering part boundary conditions. Journal of Manufacturing Processes, 44, pp.319-326.

Mirkoohi, E., Seivers, D.E., Garmestani, H. and Liang, S.Y., 2019. Heat source modeling in selective laser melting. Materials, 12(13), p.2052.

Mirkoohi, E., Bocchini, P. and Liang, S.Y., 2019. Analytical temperature predictive modeling and non-linear optimization in machining. The International Journal of Advanced Manufacturing Technology, 102(5), pp.1557-1566.

Mirkoohi, E., Bocchini, P. and Liang, S.Y., 2019. Inverse analysis of residual stress in orthogonal cutting. Journal of Manufacturing Processes, 38, pp.462-471.

Tabei, A., Mirkoohi, E., Garmestani, H. and Liang, S., 2019. Modeling of texture development in additive manufacturing of Ni-based superalloys. International Journal of Advanced Manufacturing Technology, 103.

Mirkoohi, E., Bocchini, P. and Liang, S.Y., 2018. An analytical modeling for process parameter planning in the machining of Ti-6Al-4V for force specifications using an inverse analysis. The International Journal of Advanced Manufacturing Technology, 98(9), pp.2347-2355.

Mirkoohi, E., Ning, J., Bocchini, P., Fergani, O., Chiang, K.N. and Liang, S.Y., 2018. Thermal modeling of temperature distribution in metal additive manufacturing considering effects of build layers, latent heat, and temperature-sensitivity of material properties. Journal of Manufacturing and Materials Processing, 2(3), p.63.

Project Experience

Led manufacturing defect assessments for laser-sintered stainless steel 316L, Inconel 718, Inconel 625, Ti-6V-4Al, and similar materials to enhance quality and reliability.

Managed fatigue and residual stress-induced failure assessments for industrial components such as gears, impellers, bearings, etc.

Conducted root cause analysis on electrically-induced bearing damage in electric vehicle designs.

Performed residual stress modeling for components manufactured via machining and additive manufacturing to assess failure risks.

Conducted thermal and mechanical modeling of machining processes to evaluate the impact of loads on part failures.

Analyzed thermal history effects in laser-based metal additive manufacturing to assess failure risks.