Hamed Shahi
PhD, PE
Senior Consultant

ESi

Dr. Shahi is a licensed Mechanical Engineer and Senior Consultant at Engineering Systems Inc. (ESi), with over 15 years of automotive, aerospace, and oil & gas expertise. He holds a PhD in Mechanical Engineering, specializing in multiphase thermal cavitation flows in tribological contacts within powertrains.

Throughout his career, Dr. Shahi has been instrumental in the design and development of critical systems and subsystems, including internal combustion engines, gas turbines, cryogenic turbomachinery (pumps and turbopumps), high-performance transmission systems, seals, bearings, heat exchangers, and environmental control and life support systems for spacecraft.

His extensive experience encompasses advanced analytical and numerical modeling techniques, including finite element analysis, computational fluid dynamics, and rotordynamics. Dr. Shahi leverages these skills to identify the root causes of mechanical failures, damages, and fractures, both in preventative analysis and post-incident investigations.

Education

PhD, Mechanical Engineering, Thermofluids. Loughborough University. 2015

MSc, Mechanical Engineering, Energy Conversion. Bu Ali Sina University. 2008

BSc, Mechanical Engineering. Azad University of South Tehran. 2006

Licenses & Certifications

- State of California P.E. License M 39926
- Certified Vibration Analyst: CAT II (ISO 18436-2)

Positions Held

Engineering Systems Inc., Aurora, Illinois

- Senior Consultant, 2024 – Present

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Areas of Specialization

- Automotive
- Aviation
- Boiler
- Design Analysis
- Fuel Gas Systems
- Heavy Equipment Pipeline
- Power Generation

ITW, Chicago, Illinois

- Senior Engineering Manager, 2022–2024

Whirlpool Corporation, St. Joseph, Michigan

- Engineering Manager, 2021–2022

Paragon Space Development Corporation, Houston, Texas

- Analysis Lead, Human Landing Systems, 2020–2021

Nikkiso Cryogenic Industries, Las Vegas, Nevada

- Senior Analytical Engineer, 2017–2020

University of California, Los Angeles, Los Angeles, California

- Postdoctoral Fellow in Mechanical and Aerospace Engineering, 2016–2017

Advanced Propulsion Centre, Coventry, United Kingdom

- Development Engineer, 2015–2016

SAIPA, Tehran, Iran

- Mechanical Engineer, 2008–2011

Continuing Education

- **Architecture and System Engineering: Models to Manage Complex Systems** – Massachusetts Institute of Technology, 2022
- **Rotordynamics Design and Analysis** – XDot Engineering, 2018
- **Gearbox Design and Analysis** – KissSoft AG, 2015

Professional Affiliations/Honors

American Society of Mechanical Engineers

- Member, 2013 – Present

American Society of Thermal and Fluids Engineering

- Member, 2016 – Present

Publications

"Tribology of Dust-Stop Seals of Mixing Machines," E. Fatourehchi, **H. Shahi**, R. Rahmani, H. Rahnejat, and M. Johnson, Lubrication Science, Vol. 35, No. 3, pp. 193–206, 2023.

"Thermal Analysis of an Oil Jet-Dry Sump Transmission Gear Under Mixed-Elastohydrodynamic Conditions," E. Fatourehchi, **H. Shahi**, M. Mohammadpour, and R. Rahmani, Journal of Tribology, Vol. 140, No. 5, 2018.

"Thermo-Hydrodynamics of Lubricant Flow with Carbon Nanoparticles in Tribological Contacts," **H. Shahi**, R. Rahmani, H. Rahnejat, C.P. Garner, and N. Balodimos, Tribology International, Vol. 113, pp. 50–57, 2018.

"Combined Experimental and Multiphase Computational Fluid Dynamics Analysis of Surface-Textured Journal Bearings in Mixed Regime of Lubrication," N.J. Morris, **H. Shahi**, R. Rahmani, H. Rahnejat, and C.P. Garner, Lubrication Science, Vol. 30, pp. 161–173, 2018.

"Experimental Investigation and a Novel Analytical Solution of Turbulent Boundary Layer Flow Over a Flat Plate in a Wind Tunnel," **H. Shahi** and M.M. Rashidi, International Journal of Mechanical Sciences, Vol. 133, pp. 121–128, 2017.

"VIM Solution of Squeezing MHD Nanofluid Flow in a Rotating Channel on Lower Stretching Porous Surface," **H. Shahi** and M.M. Rashidi, Advanced Powder Technology, Vol. 27, pp. 171, 2016.

"Formation of Size-Tuneable Biodegradable Polymeric Nanoparticles by Solvent Displacement Method Using Micro-Engineered Membranes Fabricated by Laser Drilling and Electroforming," R. Othman, G.T. Vladisavljević, **H. Shahi**, Z.K. Nagy, and R.G. Holdich, Chemical Engineering Journal, Vol. 304, 703–713, 2016.

"Big End Bearing Losses with Thermal Cavitation Flow Under Cylinder Deactivation," **H. Shahi**, R. Rahmani, H. Rahnejat, C.P. Garner, and D. Dowson, Tribology Letters, Vol. 57, pp. 444, 2015.

"On the Boundary Conditions in Multi-Phase Flow Through the Piston Ring-Cylinder Liner Conjunction," **H. Shahi**, M. Mohammadpour, R. Rahmani, and H. Rahnejat, Tribology International, Vol. 90, pp. 164, 2015.

"Glass Capillary Microfluidics for Production of Monodispersed Poly (dl-Lactic Acid) and Polycaprolactone Microparticles: Experiments and Numerical Simulations," G.T. Vladisavljević, **H. Shahi**, D.B. Das, E.E. Ekanem, and Z. Tauanov, Journal of Colloid and Interface Science, Vol. 418, pp. 163–170, 2014.

"A Series Solution for Three-Dimensional Navier-Stokes Equations of Flow Near an Infinite Rotating Disk," **H. Shahi** and M. Mohammadpour, World Journal of Mechanics, Vol. 4, pp. 117–127, 2014.

"Thermo-Mixed Hydrodynamics of Piston Compression Ring Conjunction," **H. Shahi**, R. Rahmani, H. Rahnejat, C. P. Garner, and P.D. King, Tribology Letters, Vol. 51, pp. 321–340, 2013.

"VIM Solution for Mixed Convection Over Horizontal Moving Porous Flat Plate," **H. Shahi** and K. Ataee, Progress in Applied Mathematics, Vol. 6, pp. 12–29, 2013.

"Analytical Study on Non-Newtonian Natural Convection Boundary Layer Flow with Variable Wall Temperature on a Horizontal Plate," **H. Shahi**, Meccanica, Vol. 47, pp. 1313–1323, 2012.

"A New Technique for Solving Steady Flow and Heat Transfer from a Rotating Disk in High-Permeability Media," **H. Shahi**, M.M. Rashidi, and O. Anwar Bég, International Journal of Applied Mathematics and Mechanics, Vol. 8, pp. 1–17, 2012.

"Variational Iteration Method for Two-Dimensional Steady Slip Flow in Micro-Channels," M.M. Rashidi, D.D. Ganji, and **H. Shahi**, Archive of Applied Mechanics, Vol. 81, 1597–1605, 2011.

"Reliable Treatment of a New Method for Solving MHD Boundary-Layer Equations," **H. Shahi**, Meccanica, Vol. 46, pp. 921–933, 2011.

"Explicit Solutions for Steady Three-Dimensional Problem of Condensation Film on Inclined Rotating Disk," **H. Shahi** and M.M. Rashidi, International Journal of Fluid Mechanics Research, Vol. 38, pp. 353–365, 2011.

"A New Solution for Steady Flow Over a Rotating Disk in Porous Medium with Heat Transfer," **H. Shahi** and M.M. Rashidi, Progress in Applied Mathematics, Vol. 1, pp. 131–141, 2010.

"A Novel Solution for the Glauert-Jet Problem by Variational Iteration Method-Padé Approximant," **H. Shahi** and M.M. Rashidi, Mathematical Problems in Engineering, doi: 10.1155/2010/501476, 2010.

"Analytical Solution of Three-Dimensional Navier-Stokes Equations for the Flow Near an Infinite Rotating Disk," **H. Shahi** and M.M. Rashidi, Communication in Nonlinear Science and Numerical Simulation, Vol. 14, pp. 2999–3006, 2009.

"Explicit Analytic Solution for an Axisymmetric Stagnation Flow and Heat Transfer on a Moving Plate by Homotopy Analysis Method," **H. Shahi** and A. Doost Hoseini, International Journal of Contemporary Mathematical Sciences, Vol. 5, pp. 699–710, 2009.

"Analytic Approximate Solutions for Unsteady Two-Dimensional and Axisymmetric Squeezing Flows Between Parallel Plates," M.M. Rashidi, **H. Shahi**, and S. Dinarvand, Mathematical Problems in Engineering, doi:10.1155/2008/935095, 2009.

"Analytic Approximate Solution of the Three-Dimensional Navier-Stokes Equations of Flow Between Two Stretchable Disks by Homotopy Analysis Method," S. Dinarvand, M.M. Rashidi, and **H. Shahi**, Numerical Methods for Partial Differential Equations, Vol. 26, pp. 1594–1607, 2009.

"Variational Iteration Method for Solving Three-Dimensional Navier–Stokes Equations of Flow Between Two Stretchable Disks," M.M. Rashidi, **H. Shahi**, and G. Domairry, Numerical Methods for Partial Differential Equations, Vol. 27, pp. 292–301, 2009.

"Variational Iteration Method for Solving Coupled Schrödinger–KdV Equation," A. Doost Hoseini and **H. Shahi**, Applied Mathematical Sciences, Vol. 4, pp. 823–837, 2009.

"New Analytical Solution of Boundary-Layer Flow of a Micropolar Fluid Through a Porous Channel," **H. Shahi**, Contemporary Engineering Sciences, 2009.

Presentations

"Thermo-Hydrodynamic Analysis of Nano-Lubricant Flow with Carbon Nano-Particles in Tribological Contacts," **H. Shahi**, 43rd Leeds-Lyon Symposium on Tribology, Leeds, UK, September 6–9, 2016.

"Modelling of Cavitation Flow in Journal Bearing Lubrication," **H. Shahi**, European Conference on Tribology, Lugano, Switzerland, 2015.

"Cavitating Flow in Engine Piston Ring-Cylinder Liner Conjunction," **H. Shahi**, ASME International Mechanical Engineering Congress and Exposition, San Diego, CA, 2013.

"CFD Modelling of Cavitation Phenomenon in Piston Ring/Cylinder Liner Conjunction," **H. Shahi**, 5th World Tribology Congress, Torino, Italy, 2013.

"Simulation of Droplet Generation in Flow-Focusing Glass Microfluidic Device," **H. Shahi**, 9th UK Particle Technology Forum, Loughborough, UK, 2012.

"Development of Novel Drug Formulation Using Microfluidic Device," **H. Shahi**, 9th UK Particle Technology Forum, Loughborough, UK, 2012.

"Analytical Approximate Solution for Two-Dimensional Steady Slip Flow in Microchannels," **H. Shahi**, International Conference on Applied Physics and Mathematics, Singapore, 2009.