Hamed Shahi PhD, PE

Senior Consultant

Dr. Shahi is a licensed Mechanical Engineer and Senior Consultant at Engineering Systems Inc. (ESi), with over a decade of expertise in the Automotive, Aerospace, and Oil & Gas industries. He holds a Ph.D. 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 (ECLSS) for spacecraft.

His extensive experience encompasses advanced analytical and numerical modeling techniques, including Finite Element Analysis (FEA), Computational Fluid Dynamics (CFD), 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.

Licenses & Certifications

- State of California P.E. License M 39926

Positions Held

Engineering Systems Inc., Aurora, Illinois

- Senior Consultant, 2024-Present

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, University of California, Los Angeles, 2016-2017

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Aurora, IL, 60504

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

Areas of Specialization

Automotive

Aviation

Boiler

Design Analysis

Fuel Gas Systems

Heavy Equipment

Pipeline

Power Generation

Advanced Propulsion Centre, Coventry, United Kingdom

- Development Engineer, 2015-2016

SAIPA, Tehran, Iran

- Mechanical Engineer, 2008-2011

Publications

Tribology of dust-stop seals of mixing machines

E. Fatourehchi, H. Shahi, R. Rahmani, H. Rahnejat, M. Johnson, Lubrication Science 35 (3), 193-206 (2023)

Thermal analysis of an oil jet-dry sump transmission gear under mixed-elastohydrodynamic conditions

E. Fatourehchi, H. Shahi, M. Mohammadpour, R. Rahmani, Journal of Tribology 140 (5) (2018)

Thermo-hydrodynamics of lubricant flow with carbon nanoparticles in tribological contacts

H. Shahi, R. Rahmani, H. Rahnejat, C.P. Garner, N. Balodimos, Tribology International 113, (2018) 50-57

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, C.P. Garner, Lubrication Science 30 (2018), 161-173

Experimental investigation and a novel analytical solution of turbulent boundary layer flow over a flat plate in a wind tunnel

H. Shahi, M.M. Rashidi, International Journal of Mechanical Sciences 133, 121-128

VIM Solution of Squeezing MHD nanofluid flow in a Rotating Channel on Lower Stretching Porous Surface

H. Shahi, M.M. Rashidi, Advanced Powder Technology, 27 (2016) 171

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. Vladisavlijević, H. Shahi, Z.K. Nagy, R.G. Holdich, Chemical Engineering Journal 304, 703-713

Big End Bearing Losses with Thermal Cavitation Flow under Cylinder Deactivation

H. Shahi, R. Rahmani, H. Rahnejat, C.P. Garner, D. Dowson, Tribology Letters, 57(2015) 444

On the boundary conditions in multi-phase flow through the piston ring-cylinder liner conjunction

H. Shahi, M. Mohammadpour, R. Rahmani, H. Rahnejat, Tribology International, 90 (2015) 164

Glass capillary microfluidics for production of monodispersed poly (dl-lactic acid) and polycaprolactone microparticles: Experiments and numerical simulations

G.T. Vladisavlijević, H. Shahi, D.B. Das, E.E. Ekanem, Z. Tauanov, Journal of colloid and interface science, 418 (2014) 163-170

A Series Solution for Three-Dimensional Navier-Stokes Equations of Flow near an Infinite Rotating Disk

H. Shahi, M. Mohammadpour, World Journal of Mechanics, 4 (2014) 117-127

Thermo-Mixed Hydrodynamics of Piston Compression Ring Conjunction

H. Shahi, R. Rahmani, H. Rahnejat, C. P. Garner, P.D. King, Tribology letters, 51 (2013) 321-340

VIM Solution for Mixed Convection over Horizontal Moving Porous Flat Plate

H. Shahi, K. Ataee, Progress in Applied Mathematics, 6 (2013), 12-29

Analytical study on Non-Newtonian natural convection boundary layer flow with variable wall temperature on a horizontal plate

H. Shahi, Meccanica 47 (2012) 1313-1323

A new technique for solving steady flow and heat transfer from a rotating disk in high permeability media

H. Shahi, M.M. Rashidi, O. Anwar Bég, International Journal of Applied Mathematics and Mechanics, 8 (2012) 1-17

Variational iteration method for two-dimensional steady slip flow in Micro-channels

M.M. Rashidi, D.D. Ganji, H. Shahi, Archive of Applied Mechanics, 81 (2011) 1597-1605

Reliable Treatment of A New Method for Solving MHD Boundary-Layer Equations

H. Shahi, Meccanica, 46 (2011) 921-933

Explicit Solutions for Steady Three-Dimensional Problem of Condensation Film on Inclined Rotating Disk

H. Shahi, M.M. Rashidi, International Journal of Fluid Mechanics Research, 38 (2011) 353-365

A new solution for steady flow over a rotating disk in porous medium with heat transfer

H. Shahi, M.M. Rashidi, Progress in Applied Mathematics, 1 (2010) 131-141

A Novel Solution for the Glauert-jet problem by variational iteration method-Padé approximant

H. Shahi, M.M. Rashidi, Mathematical Problems in Engineering, doi: 10.1155/2010/501476

Analytical Solution of Three-Dimensional Navier-Stokes Equations for the Flow near an Infinite Rotating Disk

H. Shahi, M.M. Rashidi, Communication in Nonlinear Science and Numerical Simulation, 14 (2009) 2999-3006

Explicit analytic solution for an axisymmetric stagnation flow and heat transfer on a moving plate by homotopy analysis method

H. Shahi, A. Doost Hoseini, International Journal of Contemporary Mathematical Sciences, 5 (2009) 699-710

Analytic approximate solutions for unsteady two-dimensional and axisymmetric squeezing flows between parallel plates

M.M. Rashidi, H. Shahi, S. Dinarvand, Mathematical Problems in Engineering, doi:10.1155/2008/935095

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, H. Shahi, Numerical Methods for Partial Differential Equations, 26 (2009) 1594–1607

Variational Iteration Method for Solving Three-Dimensional Navier–Stokes Equations of Flow between Two Stretchable Disks

M.M. Rashidi, H. Shahi, G. Domairry, Numerical Methods for Partial Differential Equations, 27 (2009) 292-301

Variational iteration method for solving coupled Schrödinger–KdV equation

A. Doost Hoseini, H. Shahi, Applied Mathematical Sciences, 4 (2009) 823 – 837

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. Shai presented at the 43rd Leeds-Lyon Symposium on Tribology, Leeds, UK, 6th-9th September 2016

Modelling of Cavitation Flow in Journal Bearing Lubrication

H. Shahi presented at The European Conference on Tribology 2015, Lugano, Switzerland

Cavitating Flow in Engine Piston Ring-Cylinder Liner Conjunction

H. Shahi presented at the ASME 2013 International Mechanical Engineering Congress and Exposition, ASME 2013, San Diego, CA, USA

CFD Modelling of Cavitation Phenomenon in Piston Ring/Cylinder Liner Conjunction

H. Shahi presented at the 5th World Tribology Congress, WTC 2013, Torino, Italy

Simulation of droplet generation in flow focusing glass microfluidic device

H. Shahi presented at the 9th UK Particle Technology Forum, 2012, Loughborough, UK

Development of novel drug formulation using microfluidic device

H. Shahi presented at the 9th UK Particle Technology Forum, 2012, Loughborough, UK

Analytical Approximate Solution for Two-dimensional Steady Slip Flow in Microchannels

H. Shahi presented at the International Conference on Applied Physics and Mathematics, ICAPM 2009, Singapore

Continuing Education

- **Certification for Architecture and System Engineering: Models to Manage Complex Systems** – Massachusetts Institute of Technology (MIT).
- **Certified Vibration Analyst – CAT II (ISO 18436-2)** from Vibration Institute, USA
- **Certification for Rotordynamics Design and Analysis**, XDot Engineering, Virginia
- **Certification for Gearbox Design and Analysis** from KissSoft AG, Switzerland

Professional Affiliations/Honors

American Society of Mechanical Engineers

- Member since 2013

American Society of Thermal and Fluids Engineering

- Member since 2016