Stanford

Shahab Mirjalili

Physical Science Research Scientist

Mechanical Engineering

Bio

BIO

I received my PhD in Mechanical Engineering under the supervision of Professor Ali Mani at Stanford University in June 2019. My dissertation focused on the development of numerical methods for the simulation of multiphase flows and application to studying micro-bubble generation. Prior to that, I earned my MS from Stanford University and a BS from Sharif University of Technology, both in Mechanical Engineering. I am a recipient of the Gallery of Fluid Motion Award, American Physical Society Division of Fluid Dynamics in 2018 (video). Currently, I am a physical science research scientist in the Center for Turbulence Research at Stanford University, and a senior member of the Stanford team in the INSIEME project under PSAAP III.

ACADEMIC APPOINTMENTS

- Phys Sci Res Assoc, Mechanical Engineering

PROFESSIONAL EDUCATION

- PhD, Stanford University , Mechanical Engineering (2019)

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Broadly, my research lies in the intersection of fluid mechanics, scientific computing, and machine learning. My work aims to develop and use computational methods to provide a predictive understanding of complex flow problems, including those involving multi-physics couplings and multiphase dynamics across a wide range of scales and Reynolds numbers. In this vein, I develop physically consistent models, robust numerical schemes, and high-performance computing (HPC) software that enable high-fidelity simulations of flows involving complex multi-physics effects. These developments build upon my novel work on modeling multiphase flows and my high-performance multiphase, multi-physics software. In addition to simulations, I use asymptotic analyses and machine learning (ML) to construct reduced-order models (ROMs) that can be used for engineering analysis, control, design, and especially optimization. I am interested in a wide range of applications involving impactful problems. In particular, I am passionate about improving the predictive understanding of multiphase flows in:

- Propulsion and energy conversion/storage
- Additive manufacturing processes
- Biophysical systems
- Environmental flows

Teaching

COURSES

2023-24

- Partial Differential Equations in Engineering: CME 204, ME 300B (Win)