Gokul Hariharan, Ph.D.

Los Angeles, CA. | gokulhariharan1991@gmail.com | linkedin.com/in/gokulhariharan/

Summary

The picture on the top is from my master's thesis on simulating the motion of particles in a fluidized bed. I have rich experience encompassing fluid mechanics, linear and nonlinear systems theory, control theory, matrix theory, distributed systems analysis, computational fluid dynamics (CFD), discrete element modeling (DEM), principle component analysis (PCA), model reduction, and artificial neural networks (ANN). I am proficient in finite element, finite volume, finite difference, and spectral methods. I am looking for opportunities to lead, innovate, and manage modeling and simulation in industrial and scientific pursuits.

Experience

Postdoctoral Researcher

University of Southern California   Apr 2020 - Present (2 months +)

Job geared to apply principles of advanced control theory and machine learning to control flow transition in channel flows.

Research Assistant

University of Minnesota   Jan 2016 - Apr 2020 (4 years 4 months)

~ Steered linear nonmodal analysis in viscoelastic channel flow using well-conditioned spectral methods.
~ Carried out direct numerical simulations by creating codes in C++.
~ Identified the most sensitive location to potentially trigger elastic turbulence.

Teaching Assistant

University of Minnesota   Jan 2019 - May 2019 (5 months), Sep 2018 - Dec 2018 (4 months)

Held discussions and proctored exams for two graduate courses, Linear Algebra and Fluid Mechanics.

Research Assistant

Indian Institute of Technology, Delhi   Jan 2014 - Jun 2015 (1 year 6 months)

~ Simulated the influence of smaller (ash) particles on larger (coal) particles during fluidization by using Discrete Element Modeling (DEM).
~ Tracked coal and ash movements through methods similar to Molecular Dynamics Simulations (MDS).
~ Leveraged Computational Fluid Dynamics (CFD) to simulate the gas used to fluidize coal.

Key achievements in this tenure include:
~ Showed the formation of clusters of ash during fluidization using DEM. Clusters of ash can inhibit heat transport (resulting in excess heating costs, damage to reactor etc.) during coal gasification.
~ Developed post-processing tools using Processing (https://processing.org/) to observe clusters.
~ Suggested the research to be used for fluidized bed catalytic reactors, biomass gasification, landslides, avalanches, oral inhalers, and granular flows.
~ Won the best poster award for presenting a poster in Open House – 2015 in IIT Delhi.

Research Intern

BITS Pilani, Hyderabad Campus   May 2011 - Jun 2011 (2 months)

~ Identified an optimal solution between two conflicting objectives in job scheduling in the semiconductor industry by using Artificial Neural Networks (ANN).
~ Used ANN to predict flow stress in the dynamic strain aging regime of austenitic stainless steel 316.

A few key achievements in this tenure include:
~ 58 citations for the research work since 2012.
~ Generated data for the work during the internship, and worked with Dr. Amit for a year thereafter to get it published.

Education

 University of Minnesota

Doctor of Philosophy (Ph.D.), Chemical Engineering | GPA: 3.5.   2015 - 2020
My specialization is in Fluid Mechanics. The dissertation consists of four projects:
-- Amplification of localized body forces in viscoelastic channel flows
Analyzed external disturbances in the form of localized point forces (impulses) in viscoelastic channel flow.
-- Well-conditioned spectral methods for nonmodal analysis of Newtonian and viscoelastic channel flows
Employed recently reported well-conditioned spectral methods to analyze the response of a 2D viscoelastic channel flow to small-amplitude sinusoidal disturbances.
-- Stress amplification in inertialess viscoelastic channel flows
Identified huge, near-wall stress gradients in plane Poiseuille flow and near-center stress gradients in plane Couette flow; a potential root-cause for low-inertia instabilities in viscoelastic channel flows.
-- Direct numerical simulations (DNS) using well-conditioned methods
Provided a new method to perform DNS using well-conditioned spectral methods.

 Indian Institute of Technology, Delhi

Master of Technology (M.Tech.), Chemical Engineering | GPA: 3.8   2013 - 2015

 National Institute of Technology Warangal

Bachelor of Technology (B.Tech.), Chemical Engineering | GPA: 3.8   2009 - 2013

Honors & Awards

CEMS Outstanding TA Award - CEMS, University of Minnesota, Jun 2019
Sebastian C. Reyes Fellowship - CEMS, University of Minnesota Jan 2016
Stephan J. Salter Fellowship - CEMS, University of Minnesota Jan 2016
Certificate of Excellence - Chemical Engineering Society, IIT Delhi, 2015 Department rank 1 (of 25)
Best Research Poster Award, Open House 2015 - Indian Institute of Technology Delhi 2015
Roll of Honor Gold Medal - National Institute of Technology Warangal, 2013, Department rank 1 (of 100)

Skills

C++ (Expert, 7 years' experience) • MATLAB • Python • Mathematica • MS Office • Git • OpenMP • MPI • ANN • Research • Finite Element Method • Computational Fluid Dynamics (CFD) • Decision-Making • Creative Problem Solving • Project Management • Quick Grasping • Attention to Detail • Scientific Writing • Model Predictive Control • Linear Analysis • Nonlinear Analysis • Applied Mathematics • Modeling and Simulation • Parallel programing • Thermal Engineering • Promax • Teaching • Aspen Plus

Papers and Presentations

Please visit https://gokulhari.github.io/webpage/Papers.html