Stanford



Ali Mani

Professor of Mechanical Engineering

CONTACT INFORMATION

- **Alternate Contact**

  Tel 6507251325

Bio

BIO

Ali Mani is a professor of Mechanical Engineering at Stanford University. He is a faculty affiliate of the Institute for Computational and Mathematical Engineering at Stanford. He received his PhD in Mechanical Engineering from Stanford in 2009. Prior to joining the faculty in 2011, he was an engineering research associate at Stanford and a senior postdoctoral associate at Massachusetts Institute of Technology in the Department of Chemical Engineering. His research group builds and utilizes large-scale high-fidelity numerical simulations, as well as methods of applied mathematics, to develop quantitative understanding of transport processes that involve strong coupling with fluid flow and commonly involve turbulence or chaos. His teaching includes the undergraduate engineering math classes and graduate courses on fluid mechanics and numerical analysis.

ACADEMIC APPOINTMENTS

- Professor, Mechanical Engineering
- Affiliate, Precourt Institute for Energy
- Member, Institute for Computational and Mathematical Engineering (ICME)

HONORS AND AWARDS

- Tau Beta Pi Teaching Honor Roll, Stanford University (2019)
- Career Award, National Science Foundation (2016)
- Young Investigator Award, Office of Naval Research (2015)

PROFESSIONAL EDUCATION

- PhD, Stanford University , Mechanical Engineering (2009)
- M.S., Stanford University , Mechanical Engineering (2004)
- B.S., Sharif University of Technology , Mechanical Engineering (2002)

LINKS

- Mani Research Lab: https://web.stanford.edu/~alimani

Teaching

COURSES

2026-27

- Fluid Mechanics: ME 351A (Aut)
- Fluid Mechanics: ME 351B (Win)
- Introduction to Numerical Methods for Engineering: CME 206, ME 300C (Spr)

2025-26

- Asymptotic Methods in Computational Engineering: ME 405 (Win)
- Fluid Mechanics: ME 351A (Aut)
- Introduction to Numerical Methods for Engineering: CME 206, ME 300C (Spr)

2024-25

- Seminar in Fluid Mechanics: ENGR 298 (Win)
- Turbulence: ME 361 (Spr)

2023-24

- Asymptotic Methods in Computational Engineering: ME 405 (Win)
- Turbulence: ME 361 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Ghufran Alkhamis, Nicholas Bachand, Zoe Barbeau, Kunlin Ma

Doctoral Dissertation Advisor (AC)

Noah Frank, Hoyean Le, Ela Lucas, Wenyuan Xue

Master's Program Advisor

Pragun Badhan, Mattias Cooper, Gracia Cosenza, Aidan Donovan, Marie Imad, Etienne Jacquot, Lars Osterberg, Bernie Xu

Doctoral Dissertation Co-Advisor (AC)

Xinhao Quan, Taemin Yong

Doctoral (Program)

Ben Alessio, Blake Andersen, Matthew Coughlin, Junhyuk Hwang, Lauren Korsnick, Devin Merrell, Padmanabha Prasanna Simha

Publications

PUBLICATIONS

- **Chaotic induced-charge electro-osmosis.** *Physical review letters*
  Davidson, S. M., Andersen, M. B., Mani, A.
  2014; 112 (12): 128302-?
- **Overlimiting Current and Shock Electrodialysis in Porous Media** *LANGMUIR*
  Deng, D., Dydek, E. V., Han, J., Schlumpberger, S., Mani, A., Zaltzman, B., Bazant, M. Z.
  2013; 29 (52): 16167-16177
- **Direct numerical simulation of electroconvective instability and hydrodynamic chaos near an ion-selective surface** *PHYSICS OF FLUIDS*
  Druzgalski, C. L., Andersen, M. B., Mani, A.

2013; 25 (11)

- **Current-Induced Membrane Discharge** *PHYSICAL REVIEW LETTERS*
  Andersen, M. B., van Soestbergen, M., Mani, A., Bruus, H., Biesheuvel, P. M., Bazant, M. Z.
  2012; 109 (10)
- **Analysis and optimization of numerical sponge layers as a nonreflective boundary treatment** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Mani, A.
  2012; 231 (2): 704-716
- **Physics and Computation of Aero-Optics** *ANNUAL REVIEW OF FLUID MECHANICS, VOL 44*
  Wang, M., Mani, A., Gordeyev, S.
  2012; 44: 299-321
- **Deionization shocks in microstructures** *PHYSICAL REVIEW E*
  Mani, A., Bazant, M. Z.
  2011; 84 (6)
- **Overlimiting Current in a Microchannel** *PHYSICAL REVIEW LETTERS*
  Dydek, E. V., Zaltzman, B., Rubinstein, I., Deng, D. S., Mani, A., Bazant, M. Z.
  2011; 107 (11)
- **Electroosmotic pump performance is affected by concentration polarizations of both electrodes and pump** *SENSORS AND ACTUATORS A-PHYSICAL*
  Suss, M. E., Mani, A., Zangle, T. A., Santiago, J. G.
  2011; 165 (2): 310-315
- **Effects of Constant Voltage on Time Evolution of Propagating Concentration Polarization** *ANALYTICAL CHEMISTRY*
  Zangle, T. A., Mani, A., Santiago, J. G.
  2010; 82 (8): 3114-3117
- **Prediction of Sound Generated by Complex Flows at Low Mach Numbers** *AIAA JOURNAL*
  Khalighi, Y., Mani, A., Ham, F., Moin, P.
  2010; 48 (2): 306-316
- **Theory and experiments of concentration polarization and ion focusing at microchannel and nanochannel interfaces** *CHEMICAL SOCIETY REVIEWS*
  Zangle, T. A., Mani, A., Santiago, J. G.
  2010; 39 (3): 1014-1035
- **Suitability of artificial bulk viscosity for large-eddy simulation of turbulent flows with shocks** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Mani, A., Larsson, J., Moin, P.
  2009; 228 (19): 7368-7374
- **Computational study of optical distortions by separated shear layers and turbulent wakes** *JOURNAL OF FLUID MECHANICS*
  Mani, A., Moin, P., Wang, M.
  2009; 625: 273-298
- **On the Propagation of Concentration Polarization from Microchannel-Nanochannel Interfaces Part I: Analytical Model and Characteristic Analysis** *LANGMUIR*
  Mani, A., Zangle, T. A., Santiago, J. G.
  2009; 25 (6): 3898-3908
- **On the Propagation of Concentration Polarization from Microchannel-Nanochannel Interfaces Part II: Numerical and Experimental Study** *LANGMUIR*
  Zangle, T. A., Mani, A., Santiago, J. G.
  2009; 25 (6): 3909-3916
- **Resolution requirements for aero-optical simulations** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Mani, A., Wang, M., Moin, P.
  2008; 227 (21): 9008-9020

- **Statistical description of the free-space propagation of highly aberrated optical beams** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA A-OPTICS IMAGE SCIENCE AND VISION*
  Mani, A., Wang, M., Moin, P.
  2006; 23 (12): 3027-3035