JAEKWANG KIM

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EDUCATION

University of Illinois at Urbana-Champaign, IL *2018 - 2023*
Ph.D. in Theoretical and Applied Mechanics
Department of Mechanical Engineering
Advisor: Nikhil Chandra Admal

University of Illinois at Urbana-Champaign, IL *2016 - 2018*
M.S. in Theoretical and Applied Mechanics
Department of Mechanical Engineering

Seoul National University, South Korea *2009 - 2015**
B.S. in Naval Architecture & Ocean Engineering
Graduation with the highest honors

RESEARCH INTEREST KEYWORD

Non-Newtonian fluids, Complex fluids, Numerical analysis, Uncertainty quantification, Phase-field modeling, Multi-scale modeling, Data driven reduced-order modeling, Grain microstructure in polycrystalline material

RESEARCH EXPERIENCE

Research Assistant at Admal Research Group *2019 - Present*
Mathematical modeling and simulations of microstructure evolution in polycrystalline materials

Research Assistant at Freund & Ewoldt Research Group *2016 - 2018*
Uncertainty quantification in simulation predictions of complex fluids

Undergrad Research Intern at Marine Propeller laboratory *2015 - 2016*
Shadow-graphic image analysis to ventilated super-cavities phenomena

PUBLICATION

[1] **Field sensitivity of flow predictions to rheological parameters**, J.B. Freund J. Kim, R. H. Ewoldt, *Journal of Non-Newtonian Fluid Mechanics 256*, 71–82, 2018.

[2] **Uncertainty Propagation in Simulation Predictions of Generalized Newtonian Fluid Flows**, J. Kim, P. K. Singh, J.B. Freund, R. H. Ewoldt, *Journal of Non-Newtonian Fluid Mechanics 271*, 104138, 2019.

[3] **The non-homogenous flow of a thixotropic fluid around a sphere**, J. Kim, J. D. Park, *Applied Mathematical Modeling 82*, 848-866, 2020.

[4] **A thixotropic fluid flow around two sequentially aligned spheres**, J. Kim, J. D. Park, *Korean Journal of Chemical Engineering 38*, 1460-1468, 2021

[5] **A crystal symmetry-invariant Kobayash-Warren-Cater grain boundary model and its implementation using a thresholding algorithm**, J. Kim, M. Jacobs, S. Osher, N. C. Admal, *Computational Materials Science 199*, 110575, 2021.

[6] **A stochastic framework for evolving grain statistics using a neural network model for grain topological transformation**, J. Kim, N. C. Admal, *Computational Materials Science 216*, 111812.

[7] **Adjoint analysis of viscoelastic fluid flow**, J. Kim, *Applied Mathematical Modeling 115*, 453-469.

*Including 2 years of military service during the program

CONFERENCE

[1] **Society of Rheology 89th Annual Meeting**, *Poster*, Uncertainty Propagation in Simulation Predictions of Generalized Newtonian Fluid Flows, J. Kim, P. K. Singh, J.B. Freund R. H. Ewoldt, 11 October 2017, Denver, USA.

[2] **Society of Rheology 90th Annual Meeting**, Field sensitivity of flow predictions to rheological parameters, J.B. Freund, J. Kim, R. H. Ewoldt,16 October 2018, Houston, USA.

[3] **2020 Society of Engineering Science**, J. Kim, M. Jacobs, N. C. Admal, A fast thresholding algorithm for the Kobayashi-Warren-Carter grain boundary model, 29 September - 1 October 2020, Virtual Conference (COVID-19)

[4] **16th U.S. National Congress on Computational Mechanics**, J. Kim, M. Jacobs, N. C. Admal, A Thresholding Method for the Kobayashi-Warren-Carter Grain Boundary Model with General Mobilities, 26th July,Virtual Conference (COVID-19).

[5] **19th National Congress on Theoretical and Applied Mechanics**, J. Kim, N. C. Admal, A stochastic framework for evolving grain statistics using a neural network model for grain topology transformations, 22th June, Austin, TX USA.

[6] **The 10th International Conference on Multiscale Materials Modeling**, J. Kim, N. C. Admal, A stochastic framework for efficiently evolving grain statistics, 4th October, Baltimore, MD, USA.

INVITED TALKS

[1] **National Center for Supercomputing Applications**, Industrial application group, January 27th, 2022.

[2] **University of Illinois at Urbana-Champaign**, TAM Ph.D. Seminar presentation, July 13th, 2022.

TEACHING

Graduate Teaching Fellow
Introductory Fluid Mechanics *Summer 2022*

- Hold total 24 lectures during 8 weeks period. Each lecture is two-hour length
- Topics covered: Fluid statics; continuity, momentum, and energy principles via control volumes; ideal and real fluid flow; introduction to the Navier-Stokes equation; similitude; laminar and turbulent boundary layers; closed-conduit flow, open-channel flow, and turbomachinery

TEACHING ASSISTANTSHIP

Teaching Assistantship
Thermodynamics *Spring 2022*

- Record recitation short lecture videos
- Develop homework problems

Teaching Assistantship
Introduction to Statics *Fall 2020, Spring/Fall 2021, Fall 2022*

- Lead discussion sessions (1 time/wk) for 30 students.
- Develop quiz & exam problems in *PrairieLearn* online testing/homework platform.
- Prepared in-depth solution procedures to statics problems.

Teaching Assistantship
Introductory Solid Mechanics *Summer/Fall 2019, Spring 2020, Summer 2021*

- Lead discussion sessions (1 time/wk) for 30 students.
- Maintain and add features to online class platform *PrairieLearn* using Python, html, git, and `docker`.
- Hold office hours.

Teaching Assistantship
Fundamentals of Fluid Dynamics *Spring 2019*

- Lead fluid mechanics laboratory sessions (1 time/wk) for 10 students.

· Grading laboratory reports

GRADUATE COURSES

Solid Mechanics: Solid Mechanics 1 (Fundamentals of continuum mechanics), Micro Mechanics of Material, Atomistic Solid Mechanics

Fluid Mechanics: Invicid Flow, Viscous Flow, Instability and Transition, Non-Newtonian Fluid Mechanics & Rheology, Dynamics of complex fluids

Numerical Method: Computational Mechanics, Uncertainty quantification, Advanced Finite Element Method

TECHNICAL SKILLS

Programming	C++, Python, MATLAB, Git, Unix/Linux
Software	`deal.II`, Fenics, TensorFlow, Pytorch, Gmsh, LAMMPS
Documentation & Tools	Latex, Pgfplot, Tikzfigure, Bibtex, Mathematica
Experimental Tools	Rheometer (DHR-3), Electron Microscope (JEOL 7000F)

AWARD

Teaching Fellowship, University of Illinois Mechanical Science and Engineering Department, Summer 2022.

SNUAA Scholarship, Seoul National University Alumni Association in Chicago Area, 2021.

The Schaller Travel Award A graduate student funding for participating in a technical meeting/symposium, University of Illinois Graduate College, 2021.

Graduation with Honors, Summa Cum Laude., *Ranked No.1 in the department*, President of Seoul National University, South Korea, 2015.

National Science & Technology Scholarship, Ministry of Science and Technology, South Korea, 2012–2015.

Member of Seoul National University student honor society, STEM, 2013 - *present*.

Excellence Award in Writing in Science & Technology, Dean of College of Engineering, Seoul National University, South Korea, 2013.

Excellence Award in Student Ship Design Competition, Society of Naval Architects, South Korea, 2013.

INTERNSHIP AND EXTRA-CIRRUCULAR

Lab Assistant in social outreach program, Worldwide Youth in Science and Engineering Program, 2020,2021,2022 Summer

Industry internship, Samsung Electronics Mechatronics Research Center, *Advanced Technology Research Group*, 2020 Summer

Member of Korean Tennis Club at Champaign District, 2019-2022

Exhibitor, Engineering Open House, *Rheology Zoo*, 2017, 2018

Undergrad Exchange Student, Chemical Engineering Department, Monash University, Australia, 2014

Industry internship, Korea Register of Shipping, 2013 Winter

Military Service, Korea Army Training Center, South Korea, 2010–2012