

SEUNG WHAN CHUNG

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EDUCATION

University of Illinois at Urbana-Champaign	<i>January 2017 - August 2021</i>
Ph. D in Theoretical and Applied Mechanics	GPA: 4.0/4.0
University of Illinois at Urbana-Champaign	<i>August 2014 - December 2016</i>
M. S in Theoretical and Applied Mechanics	GPA: 3.88/4.0
Seoul National University	<i>March 2008 - February 2014</i>
B. S. in Mechanical and Aerospace Engineering	GPA: 3.96/4.3

RESEARCH

- **University of Texas, Austin** September 2021 - Present
Postdoctoral Fellow (with Prof. R. Moser, Prof. L. Raja, Dr. T. Oliver) Austin, TX
 - Uncertainty modeling and propagation of plasma collision cross sections
 - Plasma modeling for prediction of inductively-coupled plasma torch dynamics
- **University of Illinois, Urbana-Champaign** January 2015 - August 2021
Graduate Researcher (with Prof. Jonathan Freund) Urbana, IL
 - Developed multi-point penalty-based optimization framework for chaotic turbulent flows.
 - Implemented and validated turbulence statistics and sound radiation of a compressible Mach-1.3 jet simulation.
 - Developed a novel regular gradient computing method for chaotic particle plasma simulations.
- **Sandia National Laboratories** January 2017 - May 2017
Student Intern (with Dr. Stephen D. Bond, Dr. Eric C. Cyr) Albuquerque, NM
 - Developed a novel regular gradient computing method for chaotic particle plasma simulations.
 - Demonstrated gradient computation for Debye shielding response and sheath edge formation.

TEACHING

- **TAM 210/211: Statics** Spring 2020
Teaching Assistant University of Illinois at Urbana-Champaign
 - Ranked as Excellent in the list of Spring 2020 semester.
 - Conducted discussion sessions (1 time/wk) for 27 students.
 - Prepared in-depth solution procedures.
 - Provided extended office hours: 6 hrs/wk

PUBLICATIONS

- S. W. Chung** & J. B. Freund, “A gradient-based optimization framework for optimal control of chaotic turbulent flows,” *In preparation*.
- S. W. Chung**, S. D. Bond, E. C. Cyr, & J. B. Freund, “Regular sensitivity computation avoiding chaotic effects in particle-in-cell plasma methods,” *Journal of Computational Physics*, **400** (2020).

CONFERENCE TALKS

- S. W. Chung** & J. B. Freund, “Multi-point augmented Lagrangian optimization for chaotic flows,” *SIAM Conference on Computational Science and Engineering*, (2021).
- S. W. Chung** & J. B. Freund. ”Multi-point augmented Lagrangian optimization for chaotic flows,” *Bulletin of the American Physical Society*, **65** (2020).
- S. W. Chung** & J. B. Freund, “Adjoint-based analysis of controllability of turbulent jet noise,” *Bulletin of the American Physical Society*, **64** (2019).
- S. W. Chung**, S. D. Bond, E. C. Cyr, & J. B. Freund, “Regular sensitivity computation avoiding chaotic effects in particle-in-cell plasma methods,” *International Conference on Numerical Simulation of Plasmas*, (2019).
- S. W. Chung**, S. D. Bond, E. C. Cyr, & J. B. Freund, “Sensitivity analysis in particle-in-cell methods,” *SIAM Conference on Computational Science and Engineering*, (2019).
- S. W. Chung**, R. Vishnampet, D. Bodony, & J. B. Freund, “Adjoint-based sensitivity of jet noise to near-nozzle forcing,” *Bulletin of the American Physical Society*, **62** (2017).

INVITED TALKS

- J. B. Freund & **S. W. Chung**, Lawrence Livermore National Laboratory, (2021).
- S. W. Chung**, *Fluid Mechanics Seminar*, University of Illinois at Urbana-Champaign, (2020).
- S. W. Chung**, Sandia National Laboratories, (2017).

RESEARCH TOOLS DEVELOPED

- **PASS: Particle Adjoint Sensitivity Sandbox**
with J. B. Freund <https://github.com/dreamer2368/PASS>
 - A Fortran-based 1D Particle-in-Cell – Monte-Carlo-Collision code for plasma kinetics simulations.
 - Particle-exact/particle-pdf sensitivity solver
- **magudi: Dual-consistent, Discrete-exact Adjoint solver for Compressible Flows**
with R. Vishnampet, J. B. Freund <https://bitbucket.org/xpacc-dev/magudi/>
 - Created verification cases to ensure discrete-exactness.
 - Developed a Python-based Bash/Flux-script generator for large-scale gradient-based optimization.
 - Incorporated multi-point penalty-based optimization framework for chaotic dynamical systems.
- **adjoint playground: Adjoint, penalty-based optimization for chaotic flow controls**
with J. B. Freund *Available upon request*
 - A MATLAB-based penalty-based optimization framework for various chaotic dynamical systems.
 - Provides a discrete-exact adjoint gradient for semi-implicit Runge-Kutta 4th-order time integrator.

AWARDS/FELLOWSHIPS

Jeong-Song Fellowship	2014 - 2016
<i>Jeong-Song Cultural Foundation, Korea</i>	\$110,000
Honor Graduation Award	2014
<i>Seoul National University</i>	Ranked 5 of 139 (summa cum laude)
Presidential Science Fellowship	2008 - 2014
<i>M. B. Lee, the President of Republic of Korea</i>	\$40,000

GRADUATE COURSES

Fluid Mechanics

Inviscid Flow

Viscous Flow

Instability and Transition

Turbulence

Computational Methods

Computational Mechanics

Uncertainty Quantification

Asymptotic Method

Mathematical Methods II

Applied Mechanics

Control System Theory & Design

Solid Mechanics I

Combustion Fundamentals

Non-Newtonian Fluid Mechanics & Rheology

SKILLS

Computer Languages

Fortran, MATLAB, Python

Parallel Programming

MPI

Scripting

Python, Bash, Flux

Compiling

Make, CMake

Documentation

L^AT_EX, Vi/Vim, Mendeley

Visualization and I/O

PLOT3D, Paraview

Presentation

Beamer, Keynote, Adobe Illustrator/Premiere