

Choah Shin

1265 N. Sterling Ave. Unit 108, Palatine, IL 60067 ◊ shinc@oregonstate.edu ◊ (224) 628 - 2327
Homepage: <https://choahshin.weebly.com/>

EDUCATION

- (Exp.) 6/2021 **PhD in Mathematics**, OSU, Corvallis, OR
◊ Advisor: Malgorzata Peszynska
◊ Focus: Computational Mathematics, Mathematical Modeling, Multiphase
Multiscale Flow and Transport, Phase-Transition, Upscaling
- 6/2018 **MS in Mathematics**, OSU, Corvallis, OR
◊ Advisor: Malgorzata Peszynska
- 5/2013 **Master in Energy Engineering**, UIC, Chicago, IL
◊ Advisor: William Ryan
◊ Topic: Developing Technology of Hydrogen Based Electrical Storage
- 5/2011 **BS in Mathematics** (minor Chemistry, Pre-Pharmacy), UIC, Chicago, IL

EXPERIENCE

- 9/2015 - Present **Graduate Teaching Assistant and Graduate Research Assistant**, OSU
GRA: Phase transitions in porous media across multiple scales (PI: M. Peszynska, NSF Grant DMS-1522734)
GTA: Instructor *Differential, and Integral Calculus*. Recitations and review sessions (multiple). Grader *Linear Algebra, Modern Algebra, Discrete Mathematics*
- 6/2019 - 8/2019 **Summer Research Intern**, NSF MSGI Program
National Renewable Energy Laboratory, Golden, CO
◊ Project: Simulation of heat transfer of supercritical helium using PeleC, an adaptive mesh refinement computational fluid dynamics code
◊ Mentor: Michael Martin
- 7/2018 - 8/2018 **Summer Research Intern**, Pacific Northwest National Laboratory
◊ Project: Mathematical models for phase equilibria of gas hydrate mixture of CH₄, N₂, and O₂ in STOMP simulator
◊ Mentor: Mark D. White
◊ Participant of the 2nd International Code Comparison Study
- 1/2013 - 5/2013 **Graduate Teaching Assistant**, UIC, Chicago, IL
◊ Assisted for *Energy for Future Decision Makers, Introductory Physics*
- 2013 - 2017 **Translator, Korean-English**, Academy of Korean Studies, South Korea
◊ Translation of texts in textbooks, presentations, reports, and booklets
- 2004 - 2016 **Private Tutor**: junior high school to undergrads
◊ Subjects: Algebra, Geometry, Trigonometry, Calculus, Differential Equations
- 2013 - 2014 **Teacher**, Euclid Academy, Rolling Meadows, IL
◊ High School Math, Chemistry, Physics, ACT/SAT, AMC8/10/12, AIME prep

PUBLICATIONS

C. Shin, A. Alhammali, L. Bigler, N. Vohra, M. Peszynska, “Coupled flow and biomass-nutrient growth at pore-scale with permeable biofilm, adaptive singularity and multiple species.” *Mathematical Biosciences and Engineering*, 2021, 18(3): 2097 – 2149. <https://doi.org/10.3934/mbe.2021108>

M. Peszynska, J. Umhoefer, C. Shin, “Reduced model for properties of multiscale porous media with changing geometry.” *Computation*, 2021, 9(3), 28, <https://doi.org/103390/computation9030028>

M.D. White, T.J. Kneafsey, Y. Seol, et al [IGHCCS2 Participants, including **C. Shin.**] “An international code comparison study on coupled thermal, hydrologic and geomechanical processes of natural gas hydrate-bearing sediments.” *Marine and Petroleum Geology*, 120:104566, 2020, <https://doi.org/10.1016/j.marpetgeo.2020.104566>

M. Peszynska, **C. Shin**, “Stability of a numerical scheme for methane transport in hydrate zone under equilibrium and non-equilibrium conditions.” Jan 2021, *submitted, revised*

AWARDS

- 10/2020 - 6/2021 **Oregon Lottery Graduate Scholarship**, Oregon State University
- 6/2020 **Graduate Student Excellence Award**, Lonseth Award, Oregon State University
- 10/2019 - 9/2020 **Larry W. Martin and Joyce B. O’Neill Fellowship**, Oregon State University
 - ◊ Stipend 1 graduate student in college of science with tuition waiver
- 6/2019 - 8/2019 **NSF Mathematical Sciences Graduate Internship Program**
- 5/2011 **Honors: High Distinction**, BS in Mathematics (UIC)

SKILLS

- Expert MATLAB, \LaTeX
- Advanced C/C++, Fortran, Python, Git
- Intermediate MPI on UNIX HPC Cluster, OpenMP, MSSQL Server 2012, AutoCAD REVIT
- Novice CUDA, OpenFoam, Java, PyTorch, HYDRUS

PRESENTATIONS: 9 talks, 9 posters, 4 seminar talks

- 6/2021 “Biofilm model at pore-scale with heterogeneous Brinkman flow, and adaptive singularity” **C. Shin**, A. Alhammali, L. Bigler, N. Vohra, M. Peszynska, J. Umhoefer, 2021 SIAM GS, Milan, Italy, *talk, anticipated*
- 3/2021 “Two Variants of Flow at Porescale with Evolving Domain and Impact on Upscaled Properties of Porous Media” **C. Shin**, M. Peszynska, 2021 SIAM CSE, ForthWorth, TX, (virtual) *talk*
- 3/2021 “Modeling of Methane Gas and Hydrate with Climate Factors: Mathematical and Numerical Analysis” **C. Shin**, M. Peszynska, 2021 SIAM CSE, Fort Worth, TX, (virtual) *poster*
- 4/2020 “Flow and Transport in Porous Media with Phase Change” **C. Shin**, M. Peszynska, 2020 Cascade RAIN Meeting, Corvallis, OR. TX, (virtual) *talk*
- 2/2020 “Numerical Analysis of Hydrate Formation and Dissociation Models in the Gas Hydrate Stability Zone” **C. Shin**, M. Peszynska, 2020 Natural Gas Hydrate Systems Gordon Research Conference, Galveston, TX, *poster*
- 11/2019 “Heat Transfer Characteristics of Supercritical Helium over Heated Plate” **C. Shin**, M.Martin, S. Yellapantula, M. Henry de Frahan, R. Grout, American Physical Society Division of Fluid Dynamics, Seattle, WA, *talk*
- 11/2019 “Numerical Analysis of Two-Phase Flow Model with Phase Change” **C. Shin**, M. Peszynska, Applied Mathematics and Computation Seminar, Corvallis, OR
- 11/2019 “Summer Internship at NREL”, **C. Shin**, Applied Mathematics and Computation Seminar, Corvallis, OR
- 10/2019 “Stability Analysis for Methane Gas Transport Models in the Gas Hydrate Stability Zone”, **C. Shin**, M. Peszynska, SIAM Pacific Northwest Section, Seattle, WA, *talk*
- 10/2019 “Simulation of Heat Transfer of Supercritical Helium over an Isothermal Flat Plate”, **C. Shin**, M.Martin, S. Yellapantula, M. Henry de Frahan, R. Grout, SIAM Pacific Northwest Section, Seattle, WA, *poster, Blitz Presentation*

- 8/2019 “The Impact of Variations of Physical Properties of Low-temperature Helium Flow in a Heated Microchannel”, 2019 Summer Intern Poster Symposium at NREL, Golden, CO, *poster*
- 7/2019 “Simulation of Low-temperature Helium Flow in a Heated Microchannel” Rocky Mountain Fluid Mechanics Research Symposium, Boulder, CO, *talk*
- 4/2019 “Stability Analysis and Solvers for Phase Transitions in Hydrate Formation” **C. Shin**, M. Peszynska, Cascade Regional Applied Interdisciplinary and Numerical (CASCADE RAIN) Mathematics Meeting, Bothell, WA, *talk*
- 4/2019 “Blow-up Behavior of Conservation Law with Spatially Varying Flux” **C. Shin**, M. Peszynska, Math Grad Appreciation Event, Corvallis, OR, *poster, blitz presentation*
- 3/2019 “Stability Analysis and Solvers for Phase Transitions in Hydrate Formation” **C. Shin**, M. Peszynska, 2019 SIAM Geosciences, Houston, TX, *talk*
- 2/2019 “Blow-up Behavior of Conservation Law with Spatially Varying Flux” **C. Shin**, M. Peszynska, 2019 SIAM Conference on Computational Science and Engineering (CSE19), Spokane, WA, *poster, blitz presentation*
- 10/2018 “Summer 2018 Internship and Workshop Experiences” **C. Shin**, Applied Mathematics and Computation Seminar, Corvallis, OR
- 8/2018 “Numerical Analysis of Nonlinear Transport Model of Methane Gas and Hydrate” **C. Shin**, M. Peszynska, ICERM-Advances in PDEs: Theory, Computation and Application to CFD Workshop, Providence, RI, *poster*
- 7/2018 “Regularization of a Nonlinear Transport Model of Methane Gas with Space-Dependent Flux Function, and Numerical Approximation” **C. Shin**, M. Peszynska, 2018 SIAM Annual Meeting (AN18), Portland, OR, *talk*
- 5/2018 “Understanding the Behavior of Nonlinear Transport Model of Methane Gas with Space-Dependent Flux Function” **C. Shin**, M. Peszynska, AMC Seminar (OSU).
- 4/2018 “Regularization of a Nonlinear Conservation Law with Space-dependent Flux Function, and Numerical Approximation” **C. Shin**, M. Peszynska, American Mathematical Society (AMS) Spring Western Sectional Meeting, Portland, OR, *talk*
- 10/2017 “Numerical Scheme for a Nonlinear Conservation Law” **C. Shin**, M. Peszynska, 2017 SIAM Pacific Northwest Section (SIAMPNWS), Corvallis, OR, *poster, blitz presentation*
- 9/2017 “Numerical Model of Coupled Free Gas and Hydrate” **C. Shin**, M. Peszynska, SIAM GS17, Erlangen, Germany, *poster, blitz presentation*

LEADERSHIP AND SERVICE

- 10/2019 Co-organizer of *Fluid Mechanics: Systems and Models* Thematic Session at 2019 SIAM PNW Conference
- 9/2018 - Present OSU Graduate Student Advisory Council: *Member*
- 6/2017 - 10/2018 OSU Student Chapter of SIAM: *President*
- ◇ Membership increased from 12 to 30 students
 - ◇ Helped organizing SIAM PNWS 2017 conference and provided logistic supports
 - ◇ Organized Linux tutorial session
 - ◇ Invited National Energy Technology Laboratory researcher to meet with students
 - ◇ Coordinated field trip to Wave Laboratory and Ocean Observing Center
- 10/2017 Student volunteer for SIAM PNWS 2017
- ◇ Helped organizing conference and logistic support

PROFESSIONAL AFFILIATIONS

- 9/2018 - Present Association for Women in Mathematics (AWM)
- 2016 - Present Society for Industrial and Applied Mathematics (SIAM)
- 2016 - Present American Mathematical Society (AMS)

8/2019 - 8/2020 American Physical Society (APS)

TRAVEL AWARDS

3/2021 SIAM CSE21 BE program, virtual
2/2020 Gordon Research Seminar Travel Support, Galveston, TX
11/2019 APS DFD Travel Support, Seattle, WA
10/2019 SIAM Student Travel Award, Seattle, WA
4/2019 CASCADE RAIN Travel Support, Bothell, WA
3/2019 SIAM Student Travel Award, Houston, TX
2/2019 SIAM CSE Travel Award, SIAM CSE19 BE Program, Spokane, WA
8/2018 ICERM Travel/Lodging Support, Providence, RI
7/2018 SIAM Student Travel Awards, Portland, OR
4/2018 Full Support, Scientific Software Days, Austin, TX
9/2017 OSU College of Science Travel Award, SIAM GS17, Erlangen, Germany
2/2017 SIAM CSE Travel Award, SIAM CSE17 BE Program, Atlanta, GA

PROFESSIONAL DEVELOPMENT

3/2021 Teaching Assistant for Tutorial session: Fundamentals of Accelerated Computing with CUDA C/C++ at SIAM CSE21
3/2021 SIAM CSE21 Broader Engagement Program, *Virtual*
12/2020 Interpore Short Course on Multiphase Flow in Permeable Media, *Virtual*
7/2020 Argonne Training Program on Extreme-Scale Computing Workshop, *Virtual*
10/2019 NVIDIA Fundamentals of Deep Learning for Computer Vision Workshop at OSU
10/2019 NVIDIA Fundamentals of Accelerated Computing with OpenAcc Workshop at OSU
6/2019 OpenFoam Workshop at OSU
2/2019 SIAM CSE19 Broader Engagement Program, Spokane, WA
4/2018–Present 2nd International Code Comparison Study for Gas Hydrate (IGHCCS2)
4/2018 Scientific Software Days Conference, Austin, TX
4/2018 CASCADE RAIN Mathematics Meeting, Portland, OR
10/2017 Linux Tutorial Workshop by OSU SIAM Student Chapter, Corvallis, OR,
Organizer
4/2017 AMS Western Section, Pullman, WA
2/2017 SIAM CSE17 Broader Engagement Program, Atlanta, GA
1/2013 - 6/2013 Chancellor's Committee on Sustainable Energy in the Energy and Utilities
Subdivision
2012 - 2013 Community Leadership Program (CLP), **Certificate**
8/2012 UIC Summer Institute on Sustainability and Energy (SISE)

FOREIGN LANGUAGES

Korean (native), English

SELECTED COURSEWORK

MTH 520 Models and Methods of Applied Mathematics
MTH 551 Numerical Linear Algebra
MTH 552 Numerical Solution of Ordinary Differential Equations
MTH 553 Numerical Solution of Partial Differential Equations
MTH 621-623 Partial Differential Equations
MTH 654 Special Topic: Finite Volume Methods PDEs
MTH 655 Special Topic: Finite Elements
MTH 656 Special Topic: Wave Propagation
MTH 659 Special Topic: Computed Tomography

MTH 659 Special Topic: Large Scale Scientific Computing with Data
BEE 542 Vadose Zone Transport
NSE 599 Application of Parallel Computing (XSEDE course)
ME 667 Computational Fluid Dynamics