JUNHO CHOI

Affiliation: Department of Mathematics, Korea Advanced Institute of Science and Technology, Daejeon-si, Republic of Korea

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RESEARCH INTERESTS

- Machine learning methodology for fast and general-purpose PDE solvers.
- The mathematical modeling and simulation of extreme ocean-wave dynamics
- Analysis and simulation on solitary waves on Euler-Poisson's equations
- Vanishing viscous problems on conservation equations

EDUCATION

PhD Department of Mathematical Sciences,
Ulsan National Institute of Science and Technology,
Ulsan, Republic of Korea 2014-2020
Dissertation: *"On Boundary Layers for the Viscous Burgers Equations in Various Domains"*
Advisor: Prof. Chang-Yeol Jung, email: cjung@unist.ac.kr

BS Department of Mathematics,
Kwangwoon University, 2008-2014
Seoul, Republic of Korea

EMPLOYMENT

- **Postdoctoral researcher** at department of mathematics, Korea Advanced Institute of Science and Technology, Mentor: Youngjoon Hong

  2023-current

- **Postdoctoral researcher** at department of mathematics, Sungkyunkwan university, Mentor: Youngjoon Hong 2022-2023

- **Postdoctoral researcher** at department of mathematical science, Ulsan National Institute of Science and Technology, Mentor: Bongsuk Kwon

  2020-2022

HONORS AND AWARDS

- **Sejong Science Fellowship Grant,** Postdoctoral Researcher Program

  the National Research Foundation of Korea

- **RA/TA Scholarship**, Doctoral Program

  Ulsan National Institute of Science and Technology, Ulsan, Republic of Korea

- **Semester Scholarships for Excellent Students**, Undergraduate Program

  Department of Mathematics, Kwangwoon University, Seoul, Korea

PUBLICATIONS

- J. Choi, T.Y. Chang, N. Kim, J. Hong, *A data free neural operator enabling fast inference of 2D and 3D Navier Stokes equations,* arXiv preprint, 2025
- J. Choi, O. Bokhove, M. Kelmanson, Y. Lu, *Variational numerical-modelling strategies for the simulation of driven free-surface waves,* EarthArXiv eprints, 2025
- J. Choi, J. Bea, B. Kwon, *Formation of singularities in plasma ion dynamics,* Nonlinearity, 37, 045011, 2024
- J. Choi, O. Bokhove, A. Kalogirou, M. Kelmanson, Y, Lu, *A study of extreme water waves using a hierarchy of models based on potential-flow theory,* Water Waves, pp. 1-53, 2024
- J. Choi, N. Kim, J. Hong, T. Yoon, *Spectral Operator Learning for Parametric PDEs without Data Reliance,* Computer Methods in Applied Mechanics and Engineering, 420, 116678, 2024

- J. Choi, N. Kim, and J. Hong, *Unsupervised Legendre–Galerkin Neural Network for Solving Partial Differential Equations,* IEEE Access, 11, pp. 23433-23446, 2023
- J. Choi, O. Bokhove, A. Kalogirou, and M. Kelmanson, *Numerical Experiments on Extreme Waves Through Oblique–Soliton Interactions,* Water Waves, pp. 1-41, 2022
- J. Choi, J. Hong, C.-Y Jung, and H. Lee, *Viscosity approximation of the solution to Burgers' equations with shock layers*, Applicable Analysis, pp. 1-27, 2021
- J. Choi, C.-Y Jung, and H. Lee, *On boundary layer for the Burgers equations in a bounded domain*, Communications in Nonlinear Science Numerical Simulation, Vol. 67, pp. 637-657, 2019

PRESENTATIONS AND INVITED LECTURES

Talk

- *Why does my machine learning method fail to solve PDEs?*, KSAIM, Seoul, Korea, 2025
- *Roles of machine learning for solving differential equations*, KMS, Deajeon, Korea, 2025
- *Spectral operator learning for parametric PDEs without data reliance,* International Union of Theoretical and Applied Mechanics, Daegu, Korea, 2024
- *Can machine learning methods be a game-changer in solving PDEs?*, KIAS, Seoul, Korea, 2024
- *Spectral operator learning for parametric PDEs without data reliance*, KSAIM, Gwangju, Korea, 2023
- *On boundary layer for the Burgers equations in a bounded domain*, SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, USA, 2019

RESEARCH VISITING

- Geophysical Fluid Dynamics Lab in University of Leeds Mar. 2023 - Aug. 2023
- School of Mathematics in Sungkyunkwan University June. 2021 - June. 2022
- Geophysical Fluid Dynamics Lab in University of Leeds Oct. 2019 - Feb. 2020

PROFESSIONAL SERVICE

Veteran, Sergeant, Korean Army 2007-2009