

Nicholas Geneva

Modern Deep Learning for Modeling Physical Systems

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Mechanical Engineering Ph.D. Candidate
South Bend, Indiana, USA

Education

Spring 2022 <i>(Expected)</i>	PhD, Mechanical Engineering University of Notre Dame
Summer 2020	MS, Applied and Computational Mathematics and Statistics University of Notre Dame
Spring 2017	BS, Honors Mechanical Engineering with Mathematics Minor University of Delaware

Experience

Present Work: Integration of physical knowledge into deep/machine learning methods for modeling and uncertainty quantification of dynamical systems and closure models. Actively working with modern machine learning approaches including *Bayesian Deep Learning*, *Generative Models*, *Graph Neural Networks* and *Transformers*.

July 2017 - Present	Research Assistant with Dr. Nicholas Zabarar , <i>University of Notre Dame</i>
Oct 2014 - Mar 2017	Undergraduate Research with Dr. Lian-Ping Wang , <i>University of Delaware</i>
Jun 2014 - Aug 2014	Research Assistant with Dr. Patricia Delgado , <i>Jug Bay Wetlands Sanctuary</i>

Select Journal Publications¹

- N. Geneva and N. Zabarar. “Transformers for Modeling Physical Systems”. In: *Neural Networks*. (2021)
- N. Geneva and N. Zabarar. “Transformers with Graph Embeddings for Modeling Physical Systems on Unstructured Domains”. In: *Preparation*. (2021)
- N. Geneva and N. Zabarar. “Modeling the dynamics of PDE systems with physics-constrained deep auto-regressive networks”. In: *Journal of Computational Physics*. (2020)
- N. Geneva and N. Zabarar. “Multi-fidelity generative deep learning turbulent flows”. In: *Foundations of Data Science*. (2020)
- N. Geneva and N. Zabarar. “Quantifying model form uncertainty in Reynolds-averaged turbulence models with Bayesian deep neural networks”. In: *Journal of Computational Physics*. (2019)
- N. Geneva, C. Peng, X. Li, and L.-P. Wang. “A scalable interface-resolved simulation of particle-laden flow using the lattice Boltzmann method”. In: *Parallel Computing*. (2017)

Notable Recognition

- **NSF Graduate Research Fellowship Program**, *National Science Foundation*
- **National Defense Science and Engineering Graduate Fellowship**, *Department of Defense*
- **ASME Outstanding Senior Design Award FSAE**, *University of Delaware*
- **Eagle Scout**, *Boy Scouts of America*

Skills

Machine Learning:	Bayesian Statistics, Bayesian Neural Networks, Graph Neural Networks, Transformers, Generative Models, Physics-Informed Deep Learning, Uncertainty Quantification
Programming:	PyTorch , Python, Fortran, MPI, Javascript, C++, C#, Java, Github
Data Processing:	Matplotlib, Pandas, Matlab, Paraview, D3.js, NCAR Command Language (NCL), Microsoft Excel, Blender

¹For full list of publications see the following [Google Scholar Profile](#).