Clarkson University

Mathematics REU Speaker Series

Summer 2022

Friday June 03, 2022 @ 11 am in SC356

Attend the talk via zoom:
https://clarkson.zoom.us/j/98680644309

Symmetry-Preserving Neural Networks for Scientific Computing

Machine learning is poised as a powerful tool that can drastically improve our ability to carry out scientific research. There are fast-growing efforts devoted to integrating machine learning with physics-based modeling to develop new interpretable and truly reliable physical models. Symmetry constraint is one of the most fundamental physical constraints for developing physical models based on machine learning, including translation, rotation, and permutation symmetry. This talk introduces a frame-independent neural network that respects all the symmetries by design. We will use force fields in molecular dynamics simulations and nonlocal constitutive models in turbulence modeling as two examples to demonstrate the strength of machine-learning-assisted modeling and the importance of preserving physical symmetries.
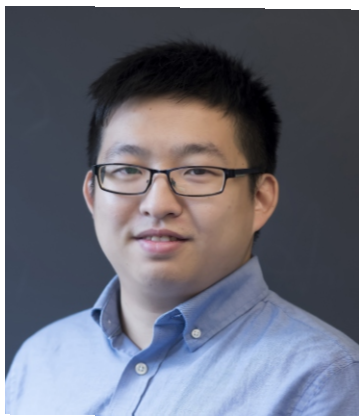
Jiequn Han, Ph. D.

Jiequn Han is a Research Fellow in the Center for Computational Mathematics, Flatiron Institute, Simons Foundation. Previously, he worked as an Instructor in the Department of Mathematics at Princeton University. His research draws inspiration from various disciplines of science and is devoted to solving high-dimensional problems arising from scientific computing. His current research interests mainly focus on solving high-dimensional controls/games and machine learning based-multiscale modeling. He holds a Ph.D. in Applied Mathematics from Princeton University, a B.S. in Computational Mathematics and a B.A. in Economics from Peking University.

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