institute for pure & applied mathematics

PDEs: Verification, Mathematics, and Algorithms in the Age of AI

SEPTEMBER 17 - 18, 2026

Scientific Overview

PDE-based models are central to scientific simulation and provide an ideal testbed for this challenge. They require mathematical correctness, structure-preserving numerical methods, rigorous floating-point numerics, and robust software implementation and validation. AI is beginning to affect every part of this pipeline, from theorem proving and algorithm discovery to code generation, surrogate modeling, and automated test creation. These developments create an urgent need for new verification methods that connect formal proof, rigorous numerics, software verification, and scientific validation, and an urgent need for a scientific dialogue around these topics.

Workshop Goals

- initiate a cross-disciplinary dialog between mathematicians, computer scientists, and practitioners to identify verification challenges that arise when AI is used to generate or modify mathematical arguments, PDE algorithms, scientific software, and numerical experiments
- build and reinforce scientific connections between researchers working on proof assistants, PDE analysis, numerical methods, scientific software, and DOE mission scientists
- stimulate international collaboration between US and Japanese researchers
- promote the involvement of Mathematics, Formalization, and AI in the DOE Genesis Mission

Organizers

Jeremy Avigad
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Motoko Kotani
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Terence Tao
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Tatiana Toro
The Simons Laufer Mathematical Sciences Institute

Michio Yoshiwaki
Tohoku University

Invited Speakers

Anima Anandkumar (California Institute of Technology), **Andrew Appel** (Princeton University), **Allison Baker** (National Center for Atmospheric Research (NCAR)), **Jacob Bedrossian** (University of California, Los Angeles (UCLA)), **Andrea Bertozzi** (University of California, Los Angeles (UCLA)), **Sylvie Boldo** (Université Paris-Saclay), **Wuyang Chen** (Simon Fraser University), **James Demmel** (University of California, Berkeley (UC Berkeley)), **Michael Douglas** (Harvard University), **Hal Finkel** (Advanced Scientific Computing Research / DOE), **Robert Joseph George** (California Institute of Technology), **Koji Hashimoto** (Kyoto University), **Amaury Hayat** (Ecole des Ponts ParisTech), **Masaaki Imaizumi** (University of Tokyo), **Tie Luo** (National Science Foundation), **Heather Macbeth** (Fordham University at Lincoln Center), **Bhavik Mehta** (University of Cambridge), **Samuel Pollard** (Sandia National Laboratories), **Sho Sonoda** (RIKEN), **Matthew Sottile** (Lawrence Livermore National Laboratory), **Taiji Suzuki** (University of Tokyo), **Kazuaki Tanaka** (Waseda University), **Terence Tao** (University of California, Los Angeles (UCLA)), **Naonori Ueda** (RIKEN), **Ravi Vakil** (Stanford University), **Takaharu Yaguchi** (Kyushu University)

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For program details and registration:

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