Preface

In the past several centuries, there have been two major different paradigms for doing scientific research: the Keplerian paradigm and the Newtonian paradigm. In the Keplerian paradigm, natural laws are discovered through the analysis of data while in the Newtonian paradigm, one focuses on pursuing fundamental principles that govern Nature. Owing to the recent development of machine learning techniques, a new paradigm for doing scientific research, AI for Science, has rapidly been established. In this new paradigm, the use of artificial intelligence (AI) techniques vastly increases our ability to analyze data or make use of the first principles. By enabling researchers to analyze large volumes of complex data and accurately simulate intricate systems, AI for Science can accelerate scientific discovery and open up new avenues for exploration and innovation. Additionally, AI for Science allows researchers to automate tedious and time-consuming tasks, freeing up their time to focus on more complex and creative aspects of their research.

We are thrilled to introduce this special issue on AI for Science, featuring a captivating collection of articles that showcase the most recent research and advances at the intersection of artificial intelligence and the sciences. This special issue comprises six peer-reviewed articles according to the standard of the journal and covers the areas of numerical solutions of partial differential equations and geometric computing. The topics of the articles include the traveltime tomography problem, solving quadratic porous medium equations, deriving a moment closure model for the Boltzmann-BGK equation, learning Green's functions of the Poisson and Helmholtz equations, boundary correspondence for domain parametrization in iso-geometric analysis, and non-rigid registration of geometric models. These problems pose serious challenges of being high dimensional and/or highly nonlinear. The contributions to this special issue come from leading researchers in the field, and provide unique perspective on the challenges and opportunities that arise when applying AI to scientific research.

We are confident that this special issue is a valuable resource for researchers, practitioners, and students interested in the rapidly evolving field of AI for Science. We

express our gratitude to the authors for their excellent contributions, and to the reviewers for their invaluable feedback and insights. Finally, we would like to thank the editorial team and the publisher for their support in bringing this special issue to fruition.

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