DATAHYKING Network-wide research and training event

Report of Contributions

Contribution ID: **1** Type: **not specified**

Welcome coffee

Contribution ID: **2** Type: **not specified**

Jingwei Hu: A brief introduction to the Boltzmann equation and its numerical methods 1/4

Monday, September 9, 2024 10:30 AM (1 hour)

In this short course, I will give a brief introduction to the Boltzmann equation including its derivation and basic properties. Then I will introduce the deterministic numerical methods, in particular, the Fourier spectral method, for solving the Boltzmann equation. Both the fast implementation and stability/convergence of the method will be discussed.

Contribution ID: 3 Type: **not specified**

Siddhartha Mishra 1/2

Contribution ID: 4 Type: **not specified**

Giovanni Samaey: Reproducible research: efficient data management strategies for high-quality open science 1/2

Monday, September 9, 2024 11:45 AM (1 hour)

TBA

Contribution ID: **5** Type: **not specified**

Jingwei Hu: A brief introduction to the Boltzmann equation and its numerical methods 2/4

Monday, September 9, 2024 2:30 PM (1 hour)

In this short course, I will give a brief introduction to the Boltzmann equation including its derivation and basic properties. Then I will introduce the deterministic numerical methods, in particular, the Fourier spectral method, for solving the Boltzmann equation. Both the fast implementation and stability/convergence of the method will be discussed.

Contribution ID: **6**   Type: **not specified**

Siddhartha Mishra: Learning Solution operators of PDEs.

Tuesday, September 10, 2024 9:00 AM (1h 30m)

Partial Differential Equations (PDEs) are ubiquitous as mathematical models in science and engineering. Numerical methods are the key tools in their study. Yet, despite their considerable success, the underlying high computational cost inhibits the scope and applicability of numerical methods and necessitates the development of alternatives. In this context, machine learning (ML) algorithms are being increasingly used as surrogates for numerical PDE solvers. In this talk, We will focus on a particular class of ML algorithms that aim to learn the solution operator of PDEs from data. The underlying issues will discussed and different architectures presented. In particular, We will present a very recently proposed Foundation Model for PDEs.

Contribution ID: **7**   Type: **not specified**

Jingwei Hu: A brief introduction to the Boltzmann equation and its numerical methods 3/4

Tuesday, September 10, 2024 11:00 AM (1 hour)

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Contribution ID: **8** Type: **not specified**

Giovanni Samaey: Reproducible research: efficient data management strategies for high-quality open science 2/2

Monday, September 9, 2024 3:45 PM (1 hour)

Contribution ID: **9** Type: **not specified**

Jingwei Hu: A brief introduction to the Boltzmann equation and its numerical methods 4/4

Tuesday, September 10, 2024 2:00 PM (1 hour)

In this short course, I will give a brief introduction to the Boltzmann equation including its derivation and basic properties. Then I will introduce the deterministic numerical methods, in particular, the Fourier spectral method, for solving the Boltzmann equation. Both the fast implementation and stability/convergence of the method will be discussed.