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NOVEL KINETIC APPROACHES IN OPTIMIZATION AND UNCERTAINTY QUANTIFICATION

500 - COMPUTATIONAL APPLIED MATHEMATICS

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ABSTRACT

Kinetic partial differential equations play a fundamental role in describing various phenomena that involve a large number of interacting particles. These models have been adopted effectively in several research fields, ranging from classical rarefied gas and plasma models to novel dynamics in socio-economical, life, and computing sciences. In this mini-symposium, we aim to bring together experts on modern applications of kinetic and mean-field equations in the context of uncertainty quantification and optimization (see [1-2] and the references therein).

The construction of numerical methods for kinetic equations with random inputs is indeed a problem attracting the attention of many researchers, due to the difficulties linked, e.g., to the high dimensional structure of the equations, the conservation of the structural physical properties, and the preservation of the equilibrium state. These challenges open new fascinating questions, both from an analytical and numerical viewpoint, that nowadays are of great interest.

In the context of computing science, many optimization methods or machine learning models can be modeled as stochastic dynamical systems in a high dimensional space. The high dimensionality may stem from the data, the model architecture, or the many agents involved. Due to their statistical nature, kinetic and mean-field equations have recently proved to be essential tools for a mathematical understanding of such systems. The mini-symposium intents to provide an overview of recent applications of kinetic theory in this field, with a focus on optimization and inverse problems.

Prof. Mattia Zanella, Prof. Liu Liu, Dr. Rafael Bailo, Dr. Yuhua Zhu, Dr. Urbain Vaes, Dr. Elisa Iacomini, Dr. Alessandro Scagliotti, Konstantin Riedl, and Anjali Nair have already shown interest in participating at the mini-symposium.

REFERENCES

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