数学与系统科学研究院

计算数学所学术报告

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报告题目：

Uniformly Accurate Machine Learning Based Hydrodynamic Models for Kinetic Equations

邀请人： 明平兵 研究员

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报告地点： 数学院南楼六层

602 教室

Abstract：

A new framework is introduced for constructing interpretable and truly reliable reduced models for multi-scale problems in situations without scale separation. Hydrodynamic approximation to the kinetic equation is used as an example to illustrate the main steps and issues involved. To this end, a set of generalized moments are constructed first through an autoencoder to optimally represent the underlying velocity distribution. The well-known closure problem is then solved with the aim of best capturing the associated dynamics of the kinetic equation. The issue of physical constraints such as Galilean invariance is addressed and an active learning procedure is introduced to help ensure that the data set used is representative enough. The reduced system takes the form of the conventional moment systems and works regardless of the numerical discretization used. Numerical results are presented for the BGK model. We demonstrate that the reduced model achieves a uniform accuracy in a wide range of Knudsen numbers spanning from the hydrodynamic limit to free molecular flow.

欢迎大家参加！