

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:

**A conservative semi-Lagrangian
HWENO scheme for linear transport
equations**

邀请人: 明平兵 研究员

报告时间: 2021年7月6日 (周二)

上午 10:00-11:00

报告地点: 数学院南楼

702 教室

Abstract:

In this presentation, we will present a high order conservative semi-Lagrangian (SL) hybrid Hermite weighted essentially non-oscillatory (HWENO) scheme for linear transport equations and the nonlinear Vlasov-Poisson (VP) system. The proposed SL hybrid HWENO scheme adopts a weak formulation of the characteristic Galerkin method and introduces an adjoint problem for the test function in the same way as the SL discontinuous Galerkin (DG) scheme {Guo et al, Monthly Weather Review, 142 (2014), pp. 457-475.}. Comparing with the original SL DG scheme, we introduce a hybrid moment-based (MB) HWENO reconstruction operator in space, bringing at least two benefits. Firstly, with the same order of accuracy, such a reconstruction allows less degrees of freedom per element in the evolution process. Secondly, it naturally possesses a non-oscillatory property when dealing with discontinuity. In addition, we derive a novel troubled cell indicator which can effectively detect the discontinuous regions for the reconstruction operator. To apply the scheme for 2-D transport equations and the nonlinear VP system, we adopt a fourth-order dimensional splitting method. Positivity-preserving (PP) limiters are applied to enforce the positivity of the solution for the system having positive solutions. Finally, we show extensive numerical tests to validate the effectiveness of the proposed SL hybrid HWENO scheme.

欢迎大家参加！