计算数学所学术报告

题目: Numerically Accurate RANS/PDF and LES/PDF Calculations of Turbulent Flames

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摘要:

Numerically accurate probability density function (PDF) calculations of turbulent jet flames are performed in the Reynolds-averaged Navier-Stokes (RANS) context first. The numerical accuracy and convergence of the PDF results are studied with respect to the number of particles per cell. The particle time-series from the PDF calculations are analyzed to investigate the local

extinction and re-ignition in a piloted turbulent jet flame, and the auto-ignition in a lifted hydrogen/nitrogen jet flame. Next, different types of weak second-order splitting schemes applicable to the stochastic differential equations from the composition PDF method are developed and validated. Finally, the current RANS/PDF capability is advanced to the large eddy simulations (LES) with the composition PDF method. A next-generation high-performance PDF code, called HPDF, is developed. The second-order convergence in space and time is verified for the new code. The HPDF code is combined with an existing LES code, and the first set of LES/PDF calculations is presented based on the new code.