au programme des séminaires ICARE…

Assessment of improved WENO schemes for the Implicit Large Eddy Simulation of turbulent non-reacting and reacting flows

par

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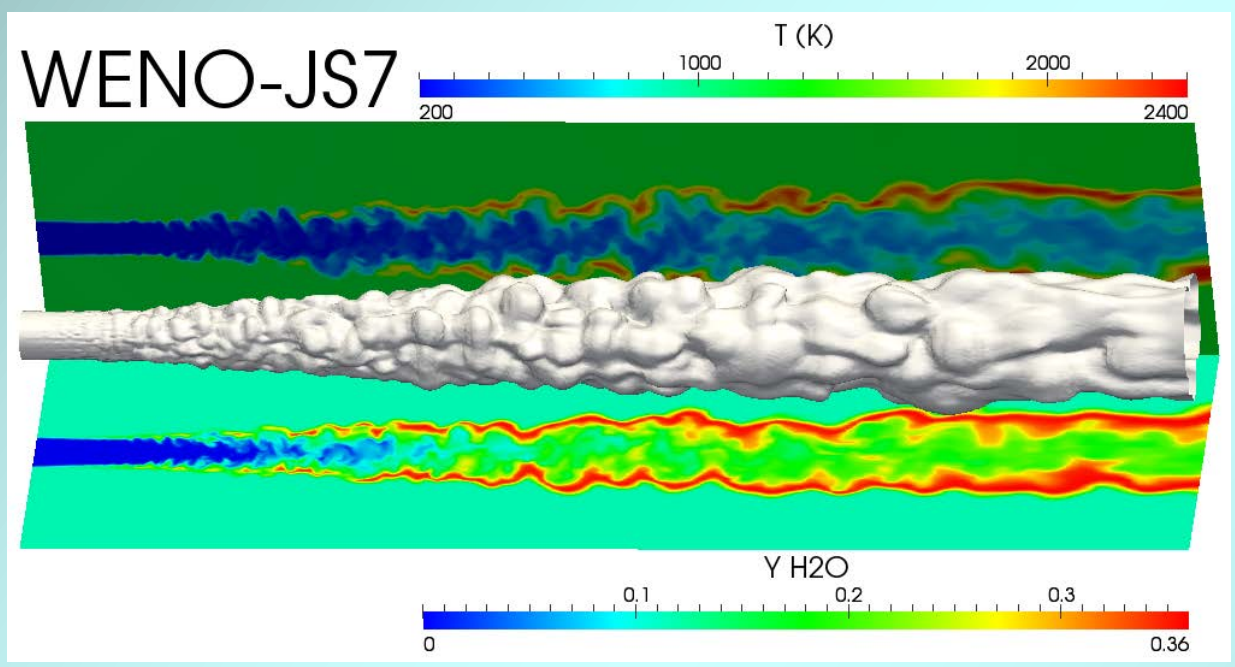
le jeudi 6 juin 2013 à 11h
salle de réunion ICARE



ILES at 7-th order of the LAERTE supersonic air/H_2 flame

Since their original presentation by Liu, Osher and Chan in 1994, Weighted Essentially Non-Oscillatory (WENO) schemes have gained maturity to progressively become a method of choice for the numerical simulation of high speed flows. The “standard” WENO-JS formulation has been proposed by Jiang and Shu in 1996. Such shock-capturing schemes can be used for the large eddy simulation (LES) of compressible turbulent flows, shocked or not. The underlying idea is that the numerical dissipation of non-linear schemes can mimic the properties of an explicit subgrid scale (SGS) model.

This approach that relies entirely on the built-in filter of the scheme and its dissipative properties to remove and model small turbulent scales in under-resolved simulations is called Implicit Large Eddy Simulation (ILES). Many improvements to the WENO-JS scheme have been proposed during the last two decades, in order to preserve higher order accuracy near critical points: examples are WENO-M, WENO-Z and very recently, WENO-NS. The use of improved WENO schemes may lead to a better resolution of smooth turbulent flows, while preserving shock capturing features for actual discontinuities. The present study aims to compare improved schemes to WENO-JS at 5th and 7th order, in a series of classical test-cases (double Mach reflection, 2D Rayleigh-Taylor Instability, 3D Taylor-Green vortex flows), and in actual ILES of transonic non-reacting and supersonic reacting flows.

Prochain séminaire prévu : 13/06/2012, 11h
Simulation numérique d’un écoulement hypersonique « extrême », par Thierry André, doctorant à ICARE

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