Seminar: An introduction to Hybrid temporal LES for turbulent flows

Abstract

A number of so-called hybrid approaches have been proposed to bridge the large-eddy simulation (LES) and the Reynolds-averaged Navier-Stokes (RANS) methodologies. Continues methodologies are intended to work in the same domain in LES mode in some regions, in RANS mode in other regions, and in hybrid mode in between. Since most of the flows of practical interest are inhomogeneous, a deficiency common among most of these proposals is the inherent difference between spatial filtering and long-time averaging, with the latter being representative of a Reynolds-average. This inconsistency can be remedied within the context of temporal filtering, such that the discussion is focused within the context of Hybrid Temporal LES (HTLES). Such an hybrid model is presented, the so-called TPITM, which is the adaptation of the PITM (Partially Integrated Transport Model) to the temporal filtering framework. Moreover, recently (Friess, Manceau, Gatski, 2015), we have established an equivalence criterion leading to another HTLES model, formally analog to DES, but based on temporal filtering and a frequency cutoff. A by-product of this analysis is the conclusion that DES and URANS can be interpreted as temporally-filtered approaches, in which a relation is assumed between the frequency cutoff and the grid step (DES) or the integral time scale (URANS).

Curriculum di Remi Manceau

Remi Manceau is a CNRS researcher at the Dpt of applied mathematics of the university of Pau, France, working in a research group associated with Inria.

He received a PhD degree from the Ecole Centrale de Nantes, France, under the supervision of Dominique Laurence.
He is a specialist of turbulence modelling for CFD in the framework of RANS and hybrid RANS-LES methodologies. He worked on the improvement of the representation of the physics in turbulence models, in particular in the near-wall region, possibly with heat transfer, mainly based on the elliptic relaxation approach. He also developed seamless hybrid RANS-LES methods based on temporal filtering, and synthetic turbulence generation methods for the zonal hybrid RANS-LES interfaces.