COMMUNICATION SKILLS 1

Master of Science in Computational Mechanics/ Numerical Methods

Fall Semester 2015

Assignment 1: Abstract

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Most of the flows in engineering applications take place in turbulent regime, which makes their computational simulation very difficult to perform. If in our case of study we are interested in the fluctuations of the velocity and pressure fields, this directly leaves Reynolds Averaged Navier-Stokes (RANS) methods out of the possible choices, and considering the excessive price of performing a Direct Numerical Simulation (DNS), the situation leads us to the use of Large Eddy Simulation (LES) methods; which can give us the required information at the lower computational cost.

LES methods are based on the theory that while larger vortexes depend on the geometry, initial conditions, boundary conditions, etc of our problem; smaller ones can be modeled. After filtering the Navier-Stokes equations the velocity field is split in a part which is going to be solved using the actual grid, and another part called subgrid where the modeling is going to be applied. This subgrid modeling saves us from having to compute all the flow scales (both spatial and temporal), meaning that less refined meshes are going to be required and consequently a lower computational cost than the one tied to using DNS.

In the future presentation it is going to be showed the grid dependence of an Implicit LES method when solving the test case knows as 'Turbulent Flow in a Channel'. It will be demonstrated that even for moderate Reynolds numbers as Re=5600 the computation of the flow becomes considerably expensive in order to get a decent accuracy. The obtained results are going to be compared with the ones coming from the simulations performed using other methods as could be DNS.