2nd High-order Workshop: Abstract

David Moxey[1], Joaquim Peiro and Spencer Sherwin

Department of Aeronautics, Imperial College London, London, SW7 2AZ, UK

1 Code description

We intend to perform simulations using the high-order code `Semtex`[2], which is a mixed 2D/1D spectral element/Fourier pseudo-spectral CPU code with arbitrary high-order capability in spectral element planes. The 3D incompressible Navier-Stokes equations are discretised using a continuous Galerkin formulation, and evolved in time using a high-order velocity splitting scheme, enabling up to third order accuracy. Parallelisation is achieved in the Fourier direction through MPI, with each process holding two or more spectral element planes.

2 Case summary and meshes

Our intention is to submit the results of a DNS simulation for case **C3.6** (DNS and LES of the flow over a 2D periodic hill) at Re = 2800. Initial simulations are underway but currently no data or visualisations are available; however we expect to be able to submit results for this test case by the April deadline.

- We have written a script to generate two-dimensional structured grids for the periodic hill geometry, with curvilinear elements at the wall boundary (see figure 1 for an example). Currently simulations are underway to determine the number of elements, mesh spacing and number of Fourier modes required to adequately resolve the structures of the flow.
- Simulations will be performed using local computing resources at Imperial College, which at the time of writing are 12-core nodes connected over an Infiniband network. We anticipate 6 of these nodes being used, with 72 cores utilised in total.

[1] `d.moxey@imperial.ac.uk`

[2] `http://users.monash.edu.au/~bburn/semtex.html`

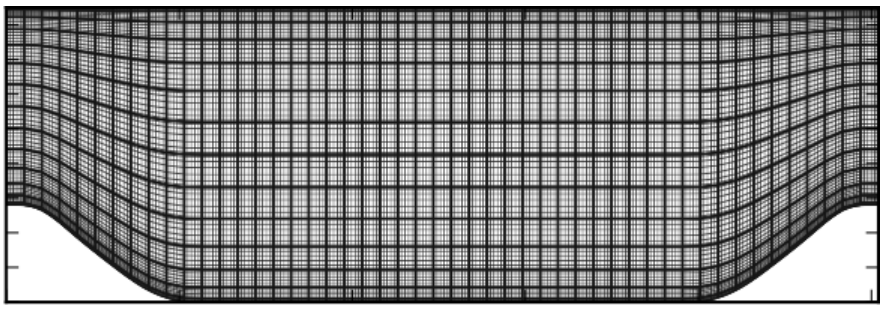

Figure 1: An example curvilinear mesh at order 6 with 686 elements.