Kaltenbach, H.-J.; **Fatica, M.**; **Mittal, R.**; **Lund, T. S.**; **Moin, P.**

Study of flow in a planar asymmetric diffuser using large eddy simulation. (English)

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Large eddy simulation has been used to study the flow in a plane asymmetric diffuser. The code is based on a hybrid second-order finite-difference/spectral method which solves the three-dimensional incompressible Navier-Stokes equations in generalized coordinates in a spanwise periodic domain. No-slip boundary conditions are applied along the solid walls, and the spanwise direction is treated as periodic. Six simulations are performed on different meshes, and the results (graphs of temporal evolution of spanwise velocity component) are presented. They are compared with measurements produced by Obi and Buice, and the agreement appears to be quite good for the mean flow, and worse for the fluctuations. The computational aspects of the results are studied, and the results appear to be grid-independent, but the influence of the subgrid-scale model is significant (for energy, not for momenta or for Reynolds stresses). Finally, the authors present details of the flow in diffuser entrance, and provide some insight into unsteady separation process which takes place in the rear part.

Reviewer: Alexander V.Gemintern (Haifa)

MSC:

76F65 Direct numerical and large eddy simulation of turbulence
76M22 Spectral methods applied to problems in fluid mechanics
76M20 Finite difference methods applied to problems in fluid mechanics
76F10 Shear flows and turbulence

Keywords:

large eddy simulation; plane asymmetric diffuser; hybrid second-order finite-difference/spectral method; three-dimensional incompressible Navier-Stokes equations; generalized coordinates; periodic domain; temporal evolution; spanwise velocity component; subgrid-scale model; diffuser entrance; separation; rear part

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