6th European Conference on Computational Mechanics (ECCM 6)
7th European Conference on Computational Fluid Dynamics (ECFD 7)
11-15 June 2018, Glasgow, UK

A LOCAL PROJECTION LAGRANGE-GALERKIN METHOD FOR NAVIER-STOKES EQUATIONS AT HIGH REYNOLDS NUMBERS.

R. Bermejo[1] and L. Saavedra[2]

[1] Matemáticas del área Industrial, ETSII, Universidad Politécnica de Madrid, Jos Gutierrez Abascal, 2, 28006, Madrid, Spain, rodolfo.bermejo@upm.es
[2] Matemática Aplicada a la Ingeniería Aeroespacial, ETSIAE, Universidad Politécnica de Madrid, Plz. Cardenal Cisneros, 3, 28040, Madrid, Spain, laura.saavedra@upm.es

Keywords: *Finite elements Local projection stabilization, High Reynolds numbers, Navier-Stokes*

In this talk we present a stabilized Backward Difference Formula of order 2- Lagrange Galerkin method to integrate the incompressible Navier Stokes equations at high Reynolds numbers. The stabilization of the conventional Lagrange-Galekin method is done via a local projection technique for inf-sup stable finite elements. We prove the stabilized Galerkin method maintains the accuracy and stability properties of the standard Galerkin one. In addiction, it is flexible in the sense that can be used with any conventional time marching scheme, and is relatively easy to incorporate in any conventional FEM code. This method is closely related with the so called Variational Multiscale Method which have been specially designed for turbulence scales separation modelling. The good results obtained in the simulation of high-Reynolds flows, suggest us that our method would be suitable for simulating more complex turbulent flows.

REFERENCES

[1] R. Bermejo and L. Saavedra, A second order in time local projection stabilized LagrangeGalerkin method for NavierStokes equations at high Reynolds numbers. Computers & Mathematics with Applications, 72(4): 820-845, 2016.