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

A HIGHER-ORDER CHIMERA METHOD FOR FLUID-STRUCTURE INTERACTION

Luis Ramírez[1*], Xesús Nogueira[1], Pablo Ouro[2], Fermín Navarrina[1], Sofiane Khelladi[3]

[1] Grupo de Métodos Numéricos en Ingeniería,
Universidade da Coruña,
{luis.ramirez,xesus.nogueira,fermin.navarrina}@udc.es

[2] Hydro-Environmental Research Centre,
School of Engineering, Cardiff University,
OuroBarbaP@cardiff.ac.uk

[3] DynFluid Lab
Arts et Métiers ParisTech
sofiane.khelladi@ensam.eu

Key Words: *High-order methods, Finite Volume, Moving Least Squares, Chimera overset grids, Fluid Structure Interaction, Tidal Turbines*

The Chimera/overset approach is widely used in the numerical simulation of flows involving moving bodies. In this approach, first used by Steger et al. in 1983 [1], the domain is subdivided into a set of overlapping grids, which provide flexible grid adaptation, the ability to handle complex geometries and the relative motion of bodies in dynamic simulations. However, most of current methods present a second order convergence at most, due to the interpolation between overlapped grids.

In this work a higher-order (> 2) accurate finite volume method [2] for the resolution of the Euler/Navier-Stokes equations on Chimera grids is presented. The formulation is based on the use of Moving Least Squares (MLS) approximations for transmission of information between the overlapped grids [3]. The accuracy and performance of the proposed method is demonstrated by solving different benchmark problems. An example of fluid structure interaction using this method is shown with the application of the proposed scheme to the computation of a Vertical Axis Turbine.

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