

RESUMO N° 32

## A HIGH-ORDER FINITE VOLUME METHOD FOR ALL SPEED FLOWS

**Xesus Nogueira**, xnogueira@udc.es

*Universidade da Coruña, Spain*

**Luis Ramírez Palacios**, luis.ramirez@udc.es

*Universidade da Coruña, Spain*

**Sofiane Khelladi**, sofiane.khelladi@ensam.eu

*Arts et Métiers ParisTech, France*

**Jean-Camille Chassaing**, jean-camille.chassaing@upmc.fr

*Sorbonne Universités, UPMC Univ Paris 06, France*

**Ignasi Colominas**, icolominas@udc.es

*Universidade da Coruña, Spain*

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In many applications compressible and nearly incompressible flows are present in the same domain. For example stagnation points and wakes behind bodies in a supersonic or transonic flow. Godunov-type finite volume methods have been widely used for decades in the simulation of compressible flows. However, these kinds of methods presents a number of problems when dealing with nearly incompressible flows: stiffness of the equations, checkerboard and the accuracy problem. The accuracy problem is related with the numerical dissipation introduced by these schemes [1].

In this work we focus in the accuracy problem. We show that the dependence of the grid size with the Mach number is reduced as we increase the order of the scheme. In addition we show that the fix proposed by Rieper [1] for a first-order Roe scheme can also be applied in a higher-order approach solving completely the accuracy problem.

For the application to all-speed flows in a high-order framework, this fix does not work correctly if a non-differentiable slope limiter is used. To solve this problem we propose a high-order finite volume method based on Moving Least Squares (MLS) [2] with a shock-wave detector based in the multiresolution properties of MLS approximations [3].

### REFERENCES:

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