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AVVISO DI SEMINARIO

"Arbitrary High Order Accurate One-Step Finite Volume and Discontinuous Galerkin Schemes on Unstructured Meshes for Conservative and Non-conservative Viscous"

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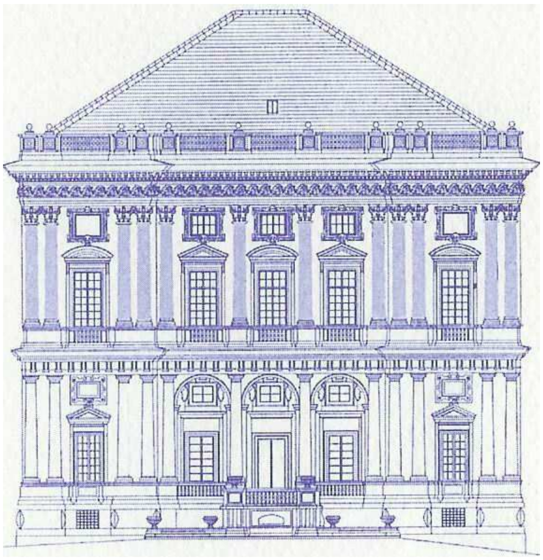

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In this presentation we propose a new unified family of arbitrary high order accurate explicit one-step finite volume and discontinuous Galerkin schemes on unstructured triangular and tetrahedral meshes for the solution of the conservative and non-conservative viscous PDE, such as the the two-layer shallow water equations, the two-fluid debris-flow and avalanche model of Pitman & Le, the compressible Navier-Stokes equations and general compressible multi-phase flow models. The new family of numerical methods has first been proposed by Dumbser, Balsara, Toro and Munz in 2008 for conservative hyperbolic systems and has been called P_NP_M schemes, where N indicates the polynomial degree of the test functions and M is the degree of the polynomials used for flux and source computation. A particular feature of the general P_NP_M schemes is that they contain classical high order accurate finite volume schemes (N=0) as well as standard discontinuous Galerkin methods (M=N) just as special cases, which therefore allows for a direct efficiency comparison.
For the compressible Navier-Stokes equations, we show several classical steady and unsteady CFD applications, such as the laminar boundary layer flow over a flat plate at high Reynolds numbers, flow past a NACA0012 airfoil, the unsteady flows past a circular cylinder and a sphere, the unsteady flows of compressible mixing layers in two and three space dimensions and finally we also show applications to supersonic flows with shocks.
For the two-layer shallow water equations and the two-fluid debris flow and avalanche model of Pitman & Le we present several numerical test cases to validate the well-balancedness of our numerical method and compare with existing reference solutions in the literature. A final application consists of a realistic debris flow in complex geometry.