Abstract Submitted
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Development and validation of a 2-D compressible vortex particle-mesh method PHILIPPE PARMENTIER[1], GREGOIRE WINCKELMANS, PHILIPPE CHATELAIN, Universite catholique de Louvain (UCL) - Institute of Mechanics, Materials and Civil Engineering (iMMC) — A compressible hybrid Vortex Particle-Mesh (VPM) method is being developed to study unsteady and fully compressible flows, either confined or unconfined. The particles are advected by the local velocity field and carry the vorticity, dilatation, density and enthalpy fields. They also change volume so as to conserve mass. The velocity is expressed into solenoidal and irrotational components using the Helmholtz decomposition. In the present approach, a Fourier-based method is used to efficiently solve the corresponding Poisson problems; it can handle bounded and unbounded problems. The underlying grid is also used to perform the spatial differential operations (except the lagrangian advection) as well as the redistribution of particles and the particle-mesh operations. The no-slip condition is enforced at solid walls while a nonreflecting boundary condition is used at the far field boundaries. The methodology is validated on prototypical unbounded vortical flows and on a driven cavity flow.

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