A 2D domain decomposition, a customized immersed boundary method and a zest of numerical dissipation: a successful cocktail to tackle turbulence on HPC systems SYLVAIN LAIZET, Imperial College London, ERIC LAMBALLAIS, P' Institute, Poitiers, J. CHRISTOS VASSILICOS, Imperial College London — Incompact3d is a high-order flow solver dedicated to Direct and Large Eddy Simulations (DNS/LES) using High Performance Computing (HPC) systems which isdevoted to turbulent flows at the interface between academic research and upstream industrial R&D. It is originating from the University of Poitiers (France) and was developed there as well as, more recently, in the Turbulence, Mixing and Flow Control Group at Imperial College London (UK). This high-order flow solver can reconcile accuracy, efficiency, versatility and scalability using a simple Cartesian mesh and up to one million computational cores. The three key ingredients of this successful cocktail to tackle turbulence on HPC systemswill be given in this talkfollowed by various applications such as fractal-generated turbulence, gravity currents in an open basin, impinging jets on a heated plate and a micro-jet device to control a turbulent jet.

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