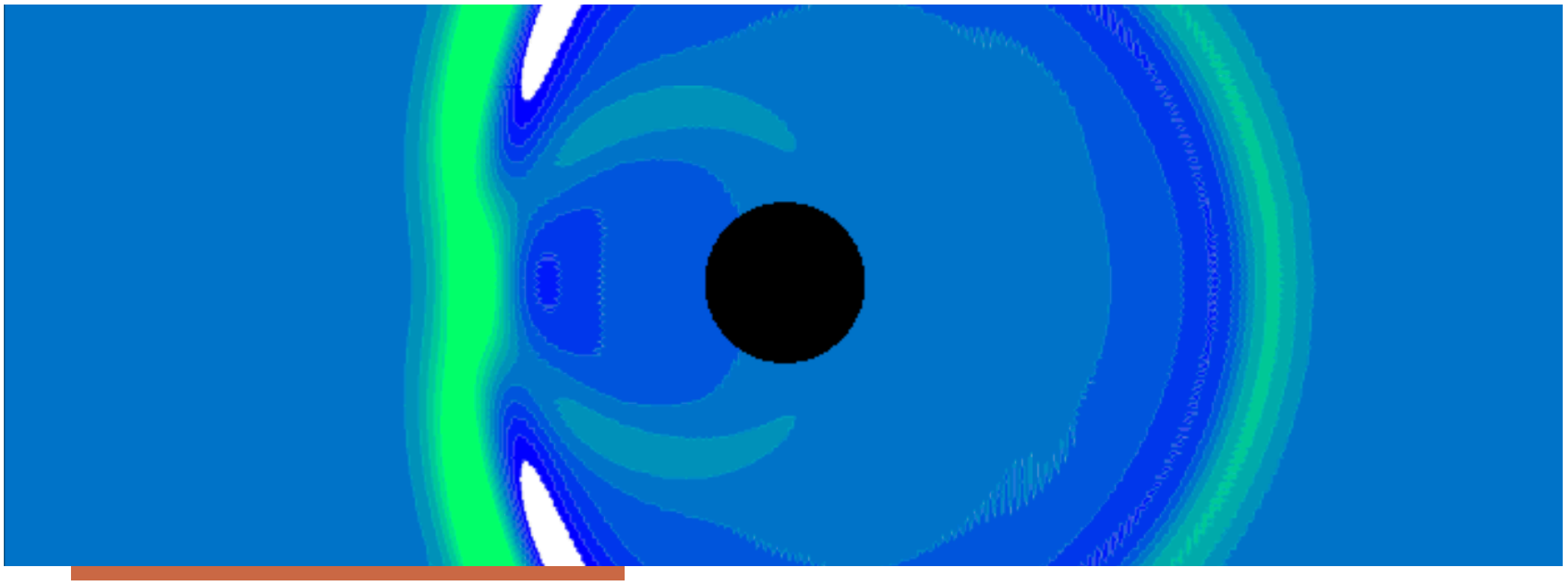

UNIVERSITÀ DEGLI STUDI DI BERGAMO | Dipartimento di Ingegneria e Scienze Applicate

Structure-preserving CFD: physics-compatible numerical methods

4 December 2025
12:45 - 13:45

Online event
Google Meet

Computational Fluid Dynamics (CFD) is a fundamental tool, but traditional numerical methods can introduce artificial errors that alter important physical properties of the system. ***Structure-preserving CFD*** offers an alternative approach: designing schemes that respect, at the discrete level, the fundamental properties of the continuous governing equations.
The seminar will present the **basic principles of discrete conservation methods and their role in simulating incompressible and compressible flows.** It will discuss how to preserve key quantities such as energy, helicity, entropy, and pressure equilibrium, both in space and time, through physics-compatible schemes and adaptive time integration techniques. Practical examples and implementations in open-source codes will also be presented, highlighting the advantages of these approaches in **scale-resolving simulations**, where accurately capturing the multiscale nature of the flow without introducing numerical artifacts is crucial. This perspective paves the way for more accurate, stable, and predictive simulations, with important implications for engineering and applied sciences.

SPEAKER
Francesco Capuano
Assistant Professor
Universitat Politècnica de Catalunya, Department of Fluid Mechanics

The seminar is open to everyone and is particularly recommended for students of the courses «Fluid Dynamics and Biofluid Dynamics» and «Computational Fluid Dynamics».

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