Modeling the flow through porous surfaces

Pier Giuseppe Ledda University of Cagliari, Italy
Camille Duprat École Polytechnique, Paris, France

Flows shaped by the interactions between porous surfaces and a surrounding fluid emerge in natural and engineered systems across scales, from wave attenuation by aquatic vegetation and atmospheric flows over cities to windborne seed dispersal, ciliary-driven airway mucus clearance and renal filtration. Applications include porous inserts for noise and drag reduction, fog-harvesting nets and fibrous filters. Across these settings, it is essential to capture how the local flow over and through porous structures influence macroscopic transport. This mini-symposium welcomes recent theoretical, numerical and experimental advances in the modeling and understanding of the link between pore-scale dynamics and large-scale flow spanning fundamental mechanics and practical applications, also including complex phenomena of porous-body flows induced by capillarity and structural deformations.

