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Strategies for the analysis of complex interface topologies in turbulent two-phase flows VINCENT LE CHENADEC, Ecole Centrale Paris, SHAHAB MIRJALILI, MILAD MORTAZAVI, ALI MANI, Stanford University — Two-phase flows of immiscible fluids occur in a wide range of phenomena encountered in environmental sciences and engineering; the interest in their prediction is therefore significant. The continuous development of High-Performance Computing technologies, and the level of predictivity reached by the numerical solvers, enable increasingly complex configurations to be tackled. This has therefore spurred the development of numerical algorithms able to carry first principle simulations of complex interfacial flows. Recent developments have highlighted the benefits of first-principle discretizations in providing accurate solutions of the underlying stiff partial differential equations. In particular, the challenge posed by the presence of an interface has been shown to be effectively addressed by a new generation of geometric Volume-of-Fluid methods, with enhanced flexibility over more traditional one-dimensional schemes. The aim of this work is to extend these capabilities to address two aspects: the statistical analysis of surfaces in complex two-phase flows, and the coupling of first-principle solvers with subgrid-scale models.

Vincent Le Chenadec
Ecole Centrale Paris

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