DualSPHysics: from fluid dynamics to multiphysics problems
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DualSPHysics is a smoothed particle hydrodynamics (SPH) Navier-Stokes solver initially developed for coastal engineering problems. Since its first release in 2011, the code has undergone continuous improvements in performance thanks to the use of latest hardware technologies, but also thanks to the coupling with wave propagating models such as SWASH and OceanWave3D. Numerous functionalities have been included over the last few years to simulate fluid driven objects. The use of the discrete element method (DEM) has enabled simulating the interactions among different bodies (e.g., sliding rocks), providing a unique tool to analyze debris flows. In addition, the recent coupling with other solvers like Project Chrono and MoorDyn has been a milestone in the development of the solver. DualSPHysics includes a multi-phase solver for simulations with gas-liquid and a combination of Newtonian and non-Newtonian models, further expanding the capabilities and range of applications. These advancements and functionalities make DualSPHysics a state-of-the-art meshless solver with emphasis on free-surface flows modeling.

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