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A FULLY LAGRANGIAN, MESH FREE METHOD FOR FLUID/SOLID INTERACTION

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Lagrangian descriptions of incompressible flows are seldom employed because of the complexity associated with tracking the position of every particle during the large motions which they can undertake, even in the simplest flows. At the same time, when using numerical methods that make this possible, it simplifies enormously the tracking of free surfaces and affords a natural treatment of the interactions with deformable (elastic or inelastic) solids and structures (see, e.g., [1, 2]).

In this work we present a numerical method for discretizing fluids and solids, and their interactions, based on a purely lagrangian formulation. To avoid the use of any kind of mesh that would inevitably entangle during the motion, a mesh-free spatial interpolation is employed based on maximum-entropy functions, with the attendant re-evaluation of the interpolation functions. The resulting formulation allows the simulation of complex fluid/solid interaction problems, including solids with extremely large deformations, including inelastic behavior.

In the talk we will discuss some of the aspects related with the formulation and stability of our approach, and showcase its performance with representative numerical simulations.

REFERENCES

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