

An Anisotropic Adaptive, Particle Level Set Method for Moving Interfaces

Juan Luis Prieto

E.T.S. Ingenieros Industriales - Universidad Politécnica de Madrid - ORCID iD:
orcid.org/0000-0001-5085-0482
juanluis.prieto@upm.es

Jaime Carpio

E.T.S. Ingenieros Industriales - Universidad Politécnica de Madrid
jaime.carpio@upm.es

Abstract

In this study, we outline the features of a novel, anisotropic adaptive, particle level set method for the simulation of moving interfaces. The method takes advantage of a semi-Lagrangian formulation to handle the convective terms, while the moving interface is captured as the zero isocontour of a certain level set function, with additional “marker particles” being added to improve mass conservation and interface resolution. The (an)isotropic adaptive, mesh refinement algorithm makes use of the concept of “metric tensor” to derive the size, shape and orientation of the optimal, anisotropic triangulation. We highlight the capabilities of this new framework for moving interfaces with a number of pure-advection tests, observing the accuracy, flexibility and computational economy of the technique, which can be extended to the simulation of multiphase flows for Newtonian and non-Newtonian fluids.

References

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