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A very accurate Arbitrary Lagrangian-Eulerian meshless method for Computational Aeroacoustics

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Abstract

In this work, we propose a new meshless approach based on a Galerkin discretization of a set of conservation equations on an Arbitrary Lagrangian Eulerian framework. In particular, we solve the Linearized Euler Equations, using Moving Least Squares as weight functions in the Galerkin discretization. Riemann solvers are introduced in the formulation for the discretization of the convective fluxes. Differently from a purely Lagrangian approach, as it is usual in SPH, the present method is able to work in both Eulerian and Lagrangian configurations, which allows using all the advantages of the Lagrangian approaches in the context of Computational Aeroacoustics.

Keywords: Meshless methods, Smoothed Particle Hydrodynamics, Moving Least Squares, Computational Aeroacoustics

1. Introduction

The low magnitude of acoustic waves and the wide range of frequencies involved in Aeroacoustics, makes mandatory the use of very accurate low-dissipative numerical schemes for the simulation of these problems. The development of Computational Aeroacoustics (CAA) is related to the development of these kinds of numerical methods. Nowadays, the standard nu-

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