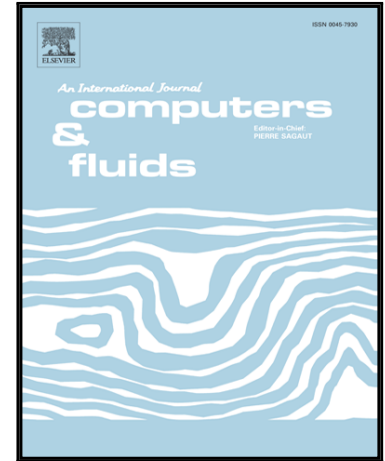


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# Inflow/Outflow Pressure Boundary Conditions for Smoothed Particle Hydrodynamics simulations of incompressible flows

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## Abstract

Open Boundary treatment is a well known issue in the Smoothed Particle Hydrodynamics (SPH) method, mainly when the truly Incompressible (ISPH) approach is employed.

In the paper a novel method is proposed to set pressure boundary conditions in the computational domain inlets and outlets, without requiring the velocity profile assignment. The new technique allows to treat in the same way inflow and outflow sections, effectively dealing with the release of new particles at inlets and the deactivation of the ones leaving the domain through the outlets.

Several 3D numerical tests, both in the laminar and turbulent regimes, are carried out to validate the proposed numerical scheme considering steady and oscillating pressure boundary conditions.

*Keywords:* SPH, Open-boundary, Pressure boundary condition, Incompressible SPH, Pressure Poisson equation

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## 1. Introduction

Smoothed Particle Hydrodynamics (SPH) is one of the most promising Lagrangian and mesh-free techniques for simulating fluid flows. The method, which was originally introduced by Gingold and Monaghan (1977) and Lucy (1977) in astrophysics, has

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