

RESUMO N° SP6

## **NUMERICAL SIMULATION OF FLUID STRUCTURE INTERACTION PROBLEMS IN GRAPHICS PROCESSING HARDWARE; EXPERIMENTAL VALIDATION**

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General Purpose Graphics Processing Units (GPGPUs) are coprocessor boards that have a very high raw computing power with respect to their price. In this work we present the implementation of a fluid structure interaction (FSI) code that runs on GPGPUs. The code is based on the SIMPLE Method with a co-located Finite Volume discretization on structured Cartesian grids. As uniform Cartesian grids are used, the solid interface usually do not coincide with the mesh, and then a second order Immersed Boundary Method is proposed, in order to avoid the loss of precision due to the staircase representation of the surface. Moreover, a novel submerged buoy experiment is also reported and validates the presented fluid-structure algorithm. The experiment consists of a sphere with positive buoyancy fully submerged in a cubic tank, subject to harmonic displacements imposed by a shake table. The sphere is attached to the bottom of the tank with a string. Position of the buoy is determined from video records with a Motion Capture algorithm. The obtained amplitude and phase curves allow a precise determination of the added mass and drag forces. Due to this aspect the experimental data can be of interest for the validation of fluid-structure interaction codes. Finally, the numerical results are compared with the experiments, and allows the validation of the numerically predicted drag and added mass of the body.