國立陽明交通大學應用數學系

學術演講公告

主講人：陳孟豁 教授(中正大學 數學系)

講　題：Fluid-structure interactions: one-field monolithic fictitious domain method and its parallelization

時　間：110 年 3 月 30 日(星期二) 下午 14:00 –15:00

地　點：(光復校區) 科學一館 223 室

茶　會：當天下午 13:30 (科學一館 205 室)

Abstract

In this research we implement the parallelization of the method: one-field monolithic fictitious domain (MFD), an algorithm for simulation of general fluid-structure interactions (FSI). In this algorithm only one velocity field is solved in the whole domain (one-field) based upon the use of an appropriate L^2 projection. "Monolithic" means the fluid and solid equations are solved synchronously (rather than sequentially). For 3D fluid-structure interaction simulations on moderately resolved meshes it is quite often that the computaions take several weeks or even months. We parallelize the finite element discretization and the linear system solver in order to reduce the simulation time from several months to few days. At the initial stage of the research we focus on parallelizing the algorithm on uniform meshes. The implemented parallel algorithm is then extended to the simulations on nonuniform meshes, where an adaptive mesh refinement scheme is used to improve the accuracy and robustness. Our goal is to provide an efficient, robust algorithm which can handle the difficult fluid-structure interactions such as the collision of multiple immersed solids in fluid where the high resolution mesh is necessary for resolving the phenomena near the collision and fluid-structure interfaces.

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