A FLUID-STRUCTURE INTERACTION ANALYSIS USING STABILIZED BUBBLE FUNCTION ELEMENT

J. MATSUMOTO[a], **T. SUZUKI**[b], and **A. TEZUKA**[c]

[a]Research Institute for Computational Sciences, AIST, and PRESTO, JST
Chuo-2, 1-1-1 Umezono, Tsukuba, Ibaraki, 305-8568, Japan
junmcct@ni.aist.go.jp

[b]Research Institute for Computational Sciences, AIST
Chuo-2, 1-1-1 Umezono, Tsukuba, Ibaraki, 305-8568, Japan
suzuki.t@aist.go.jp

[c]Research Institute for Computational Sciences, AIST
Chuo-2, 1-1-1 Umezono, Tsukuba, Ibaraki, 305-8568, Japan
tezuka.akira@aist.go.jp

The Petrov-Galerkin formulation with bubble function that is stabilized bubble function method [1] is proposed for the incompressible Navier-Stokes equations. For the purpose of the improvement in efficiency and stability and accuracy of the calculation, spatial discretization is applied to the mixed interpolations for the velocity and pressure fields by the stabilized bubble element and linear element, respectively. This paper presents a finite element analysis of a fluid structure interaction problem [2], in which the fluid is treaded as incompressible viscous flow, and a structure is idealized by elastic springs. The arbitrary Lagrangian-Eulerian (ALE) method [3][4] is employed to solve the flow field around the structure, and fractional step method is adopted for the time integration. For the numerical example, the present method is applied to the flow analysis around the oscillating rectangular and cylinder. The purpose of this paper is to formulate fluid structure interaction problem with strong of incompressible viscous flow. The advanced bubble function formulation with Petrov-Galerkin method obtains better stability than the classical bubble function formulation with Bubnov-Galerkin method[5][6][7].

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