Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

A Modified Cut-cell Approach for Inclined Boundary Conditions on Computational Fluid Dynamics SAYURI TANAKA, NAOKI SHIMADA, YOSHIHIDE MATOBA, Sumitomo Chemical Co., ltd. — A simulation method of fluid dynamics based on cut-cell approach was modified to deal with distorted boundary conditions. Most conventional cut-cell methods focus on a flux control across computational grids. On the other hand, we combined interpolation of fluid velocity and re-defined wall shear stress by using normal distance and projected fluid velocity. This combination was implemented in the structured computational grid. In addition, Detached Eddy Simulation approach with non-slip wall and logarithmic wall function model were used for calculation on turbulent flow in this study. Two-dimensional laminar flow with an inclined channel and air flows around a cylinder in three-dimensional fields were calculated to demonstrate applicability of our approach. As a result, we were able to obtain fair flow fields without any numerical instability, and its calculation efficiency was much higher than that based on unstructured approach from the viewpoint of accessibility of computational memory.

Sayuri Tanaka
Sumitomo Chemical Co., ltd.

Date submitted: 30 Jul 2019 Electronic form version 1.4