

Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Numerical simulation of negative Magnus force on a rotating sphere MASAYA MUTO, MAKOTO TSUBOKURA, NOBUYUKI OSHIMA, Hokkaido University — Flow characteristics and fluid force on a sphere rotating along with axis perpendicular to mean air flow were investigated using Large Eddy Simulation at two different Reynolds numbers of 10,000 and 200,000. As a result of simulation, opposite flow characteristics around the sphere and displacement of the separation point were visualized depending on the Reynolds number even though the sphere rotates at the same rotation speed according to the Reynolds number. When Reynolds number is 10,000, flow characteristics agree with the flow field explained in the Magnus effect. However sphere rotates at the same rotation speed while increasing Reynolds number to 200,000, separation point moves in opposite direction and wake appears in the different direction. The reason of the negative Magnus force was discussed in terms of the boundary layer transition on the surface.

Masaya Muto
Hokkaido University

Date submitted: 09 Aug 2010

Electronic form version 1.4