

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

LIF measurements of the flow past a sphere descending in a stratified fluid SHINSAKU AKIYAMA, SHINYA OKINO, HIDESHI HANAZAKI, Kyoto Univ — When a sphere descends in the stratified salt water, a strong upward jet is often generated above the sphere. In this study, the flow is observed by the laser induced fluorescence (LIF) method, assuming the proportionality between the concentrations of salt and fluorescent dye. In particular, the radius of the jet and the thickness of the density boundary layer on the sphere surface are measured. It is found that the radius of the jet is proportional to both $Fr^{1/2}$ (Fr : Froude number) and $Re^{-1/2}$ (Re : Reynolds number), in agreement with the simple dimensional analysis. The density boundary layer on the sphere surface also becomes thinner as Fr decreases or Re increases, showing a similar trend. These results are explained by a scenario that the fluid in and near the density boundary layer on the sphere moves up along the sphere surface, changing its density across the isopycnals to finally form a jet above the sphere.

Hideshi Hanazaki
Kyoto Univ

Date submitted: 30 Jul 2014

Electronic form version 1.4