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Interaction between two drops ascending in a linearly stratified fluid

M. Bayareh[1], S. Dabiri[2], A. M. Ardekani[2]*,

Abstract

Three-dimensional numerical simulations of the interaction between two drops rising in a thermally stable stratified fluid are presented. The governing equations are solved by a finite-volume/front-tracking method. The influence of stratification on the dynamics of two drops moving in line and side by side is studied. For the case of nearly spherical drops ascending side by side, drops remain in the horizontal alignment during the interaction; but the rate of separation, after their initial collision, decreases as the stratification becomes stronger. We demonstrate that, in contrast to the case of homogeneous fluid, two drops moving in tandem in a linearly stratified fluid retain their in-line configuration. In addition, the vortical structure behind the drops ascending in a linearly stratified fluid is shown to be the reason for the smaller magnitude of rise velocity of drops compared to that in a homogeneous fluid.

Keywords: Stratified fluid, Drop, Finite volume, Front-tracking method.

[1] *Department of Mechanical Engineering, ShahreKord University, ShahreKord, Iran, 88186- 34141.*
[2] *Department of Aerospace and Mechanical Engineering, Purdue University, West Lafayette, IN, USA*
**Corresponding author: Email:arezoo.ardekani.1@nd.edu*

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