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**A discussion on the effect of bubble induced liquid velocity on the mass transfer performance of bubbles in bubble plumes.** XIAOBO GONG, SHU TAKAGI, YOICHIRO MATSUMOTO, Department of Mechanical Engineering, the University of Tokyo — The effect of the bubble induced liquid velocity on the mass transfer performance of bubbles in bubble plumes has been studied numerically. A two-way coupling Euler-Lagrange method was adopted for the modeling of bubble plumes with mass transfer. The dissolution of air (nitrogen and oxygen, mainly considered) in bubble plumes with micro bubbles, $100\mu$m$\leq$ $d_0$ $\leq$1mm, was simulated. The results show that in the plume with 1mm bubbles, the ratio of the bubble induced liquid velocity to bubble's terminal velocity is less than 1 and the averaged residence time of bubbles does not change much compared with a single bubble's rising period; but in the plume with $100\mu$m bubbles, the ratio is over 10 and the averaged residence time of bubbles is around 10% of the single bubble's rising period. The result suggests that under the same gas supply rate, the benefits of using smaller bubbles for high mass transfer efficiency will be overestimated without considering the reduce of the residence time of bubbles due to the effect of the bubble induced liquid velocity. The present simulations show that the dissolution efficiency of oxygen in the air bubble plume with $100\mu$m bubbles is only half of that in a single bubble.

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