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The effect of the Reynolds number on mass transfer at a free surface in a fully developed turbulence RYUICHI NAGAOSA, Institute of Environmental Management Technology, AIST Tsukuba West — This study deals with mass transfer mechanism into a turbulent liquid at a free surface in an open channel. Both mass flux and subsurface hydrodynamics measured in laboratory measurements and found that the normalized mass transfer coefficient is proportional to the Reynolds number Re_m which is defined by water depth and the bulk mean velocity [S. Komori, R. Nagaosa and Y. Murakami, AIChE J. **36**, 957, 1991]. Direct numerical simulations (DNS) of mass transport at the free surface in a fully developed turbulence have been carried out in this study to discuss suitability of the results of the previous laboratory experiments. The results of this study show that the predicted mass transfer velocities by the DNS technique agree well with our previous laboratory measurements. The mass transfer velocities predicted in the present DNS are, however, proportional to 3/4 power of Re_m, rather than 1 as found in the laboratory experiments. The difference of the exponent could be a reason of underestimation of mass flux in the numerical predictions in a larger Reynolds number turbulence of about $\mathrm{Re}_m > 10,000$.

Ryuichi Nagaosa
Institute of Environmental Management Technology, AIST Tsukuba West

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