

Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Numerical Simulation of Bubbly Flows in an Aeration Tank with Biochemical Reactions KHATEEB NOOR UL HUDA, KAZUYA SHIMIZU, University of Tokyo, XIAOBO GONG, Shanghai Jiao Tong University, SHU TAKAGI, University of Tokyo — For bubbly flow with biochemical reactions, all the analyses including overall fluid flow, bubble motion, bubble dissolution at local level and bacterial reactions/consumption of substrates are important. The developed system is provided by mixed Eulerian-Lagrangian formulation in which liquid media is represented in Eulerian system and bubbles are tracked individually. Murai and Matsumoto [1] developed a model to track bubbles to predict plume structure in finely dispersed domain. Gong et al. [2] developed the model further to include mass transfer, gas dissolution and mixing phenomenon entrained in this model. In this research we are using the model to include simulation of bacterial biochemical reactions for the purification of water and make it resemble as the wastewater purification tank. The gas bubble dissolution and mass transfer from gas to liquid phase is linked with biochemical reactions for an overall comprehensive study. The main area associated with this research is to incorporate all biochemical reactions in this bubbly flow based on situation of water and demand. In this particular study, various kinds of biomass and substrates are considered. A detailed model for biological wastewater purification involving reactions using bacteria's is developed and primary validation has been carried out based on experimental study. Finally, we tried to achieve physical optimization for this biochemical reactions. [1] Murai, et al., ASME-Publications-FED, 236, (1996), pp. 67-74. [2] Gong, X., et al., 2009, Int J Multiphas Flow, 35, pp.155-162.

Khateeb Noor Ul Huda
University of Tokyo

Date submitted: 13 Jul 2016

Electronic form version 1.4