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Quantitative consideration of flow structures (bubble swarms and liquid motion) and dissolved CO2 concentration transportation, in a bubbly flow DAISUKE SHINOHARA, Graduate School of Engineering, Shizuoka University, TAKAYUKI SAITO, Research Institute of Green Science and Technology, Shizuoka University — The objective of the present study is to clarify the relationship between large scale flow structures (: bubble swarm and liquid motion) and dissolved CO2 concentration transportation, in a large-diameter bubble column. For this specific purpose, the time-series void fractions, dissolved CO2 concentration and liquid-phase-velocities were simultaneously measured by using a photoelectric optical fiber probe (POFP) and Laser Doppler Velocimetry. The POFP was newly developed in order to simultaneously measure bubble characteristics and dissolved CO2 concentration. We calculated the spatial scale of the bubble swarms and liquid motion based on the thinking of the integral length scale. The spatial scale of the bubble swarms and liquid motion was large in the bottom zone. Moreover, the size of this spatial scale changed with time; i.e. the flow structures changed with time in the bottom zone. The characteristics of the flow structures in the bottom zone faded out towards the upper zone of the column. The cross-correlation coefficients of dissolved CO2 concentration were calculated at several zones by height. As a result, the relationship between the flow structures and dissolved CO2 concentration transportation was found out.

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