LABORATORY STUDY

OF BUBBLE CLOUDS CHARACTERISTICS

AT VARIOUS CONDITIONS

by

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ABSTRACT

Understanding bubble clouds can be helpful in elucidating the dynamics of the upper-ocean boundary layer (Thorpe, 1992). The effects are subtle; for example void fractions as low as 1% can reduce the sound speed in water by an order of magnitude (Lamarre and Melville, 1991). The models of bubble mediated gas transfer depends on reliable estimates of the initial bubble size distribution (Melville et al., 1995). While many studies have been done on the population and general description of microbubbles already dispersed in the near-surface layer, few investigations have reported on bubble clouds. A systematic parameterization of the bubble clouds characteristics under various and well-controlled conditions is necessary.

A laboratory study of bubble clouds produced by breaking waves under various wind velocities in both fresh and salt waters and at different water temperatures is presented. Video imaging technique is employed. Reported parameters of interest are: the spatial and temporal evolution of cloud shape, penetration depth, void fraction. The possibility of obtaining bubble size distributions from measured void fraction is investigated.