

Bubble convection forced by produced bubbles at 1 point.

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As the variation of bubble convection, the bubble convection experiment that has the compulsion of bubble only with 1 point is performed. Pumping air to the lower part of the tank of the diameter of 1.2 m, bubbles were produced. As for the experiment of bubble convection, *****there are Kimura (1988) etc. Those are the experiments of the convection happens by homogeneous bubbles. The experiment in this time is produced bubbles only with a point.

Bubbles happens continuously when air is pumped in the bottom of the water tank. With bubbles going up because of buoyancy, dragging the water of the surroundings, upflow occurs. On the surface of the water, there are the flow divergence right above the producing point of bubbles. The bubbles reached the water surface are not break, they are transport to outward. The time of life of bubbles are differ form each other, no bubbles exists the out side of the certain radius centering around the flow produced point.

[Result 1:Second Flow]

The one of probable reason is existing of flow converge to the center of bubble circle on the surface outside of the circle. Actually, existence of such flow is confirmed with ink. In detail, the bubble circle is ellipse, and there are the outward flow along to long axis.

[Result 2: aspect ratio]

When the depth of water is not so deep, the ratio of the depth and the radius of convection nearly 1. The flow of 2nd convection is too weak to measure, and 3rd convection does not occur.

[Result 3: the influence of visualization]

When flour, instead of ink, is scattered on surface for visualization of the flow, the bubble arrival radius immediately grows to several times. However, the flour velocity are not agree with flow velocity. The of probable reason is bubbles are separated from the surface flow, and initial bubble velocity is remain not with decelerate, but details are indistinct.