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Effect of wake behind a rising bubble on the heat transfer of the vertical heated wall[1] HWIYOUNG MAENG, HYUNGMIN PARK, Seoul national university — We conduct experiments with two kind of bubbles (linear and zigzagging bubble of which Reynolds number is 200 and 850) rising near the vertical heated (at a constant heat flux of 2000 W/m^2) wall. While varying the distance between the bubble and the wall, we measure the gas- and liquid-phase flow fields with two-phase PIV and wall temperature distribution using an infrared camera simultaneously. We find out that the wake emanating behind the zigzag bubble convects laterally toward the wall, disturbing the natural convective boundary layer and enhances the local convective heat transfer, which is quantified as a Nusselt number (Nu) normalized by that of natural convection. As the distance between the bubble and the wall is smaller, the increasing slope and affected area of the heat transfer become larger. The maximum Nu augmentation is eight times larger than the reference value when the bubble-wall distance is short enough for the bubble to collide with the wall, but the affected area is maximum when the bubble does not collide but passes closely to the wall. In the case of linearly rising bubble, however, the heat transfer enhancement was not measured evidently, because the wake is stationary and does not convect to the vertical wall effectively.

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