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Numerical Simulation of a Bubble Bouncing with a Free Surface TOSHIYUKI OYAMA, SHINTARO TAKEUCHI TEAM, SHU TAKAGI TEAM, YOICHIRO MATSUMOTO TEAM — The paper presents a numerical study of a bubble-bouncing with a free surface using a three dimensional front-tracking method. According to our preliminary study, the bubble-free surface interaction is summarized as follows. The bubble becomes slightly oblate as it propels upward, and the bubble starts contacting at the side, rather than the top, to the elevated free surface. Then the liquid in film between the bubble and free surface is gradually drained until the bubble reaches the highest position. Finally, the bubble bounces back from the free surface due to the stored energy on the both of the surfaces and the self-induced flow field. We focus in the rebound depth, and duration time of bubble-free surface contact (contact time, hereafter). The contact time measured from the distance between the bubble center and free surface exhibits -0.5 power of surface tension coefficient, whereas the contact time based on the distance between the bubble top and free surface was found to be insensitive to surface tension coefficient. In the presentation, we also discuss the velocity field within the liquid film and the time-dependency of the film volume.

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