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Visualization of the Rise of a Bubble in a Two-Dimensional Air-Fluidized Bed

Chen, S.* and Jin, J.*

* State Key Laboratory of Clean Energy Utilization, Zhejiang University, Hangzhou, 310027, China.

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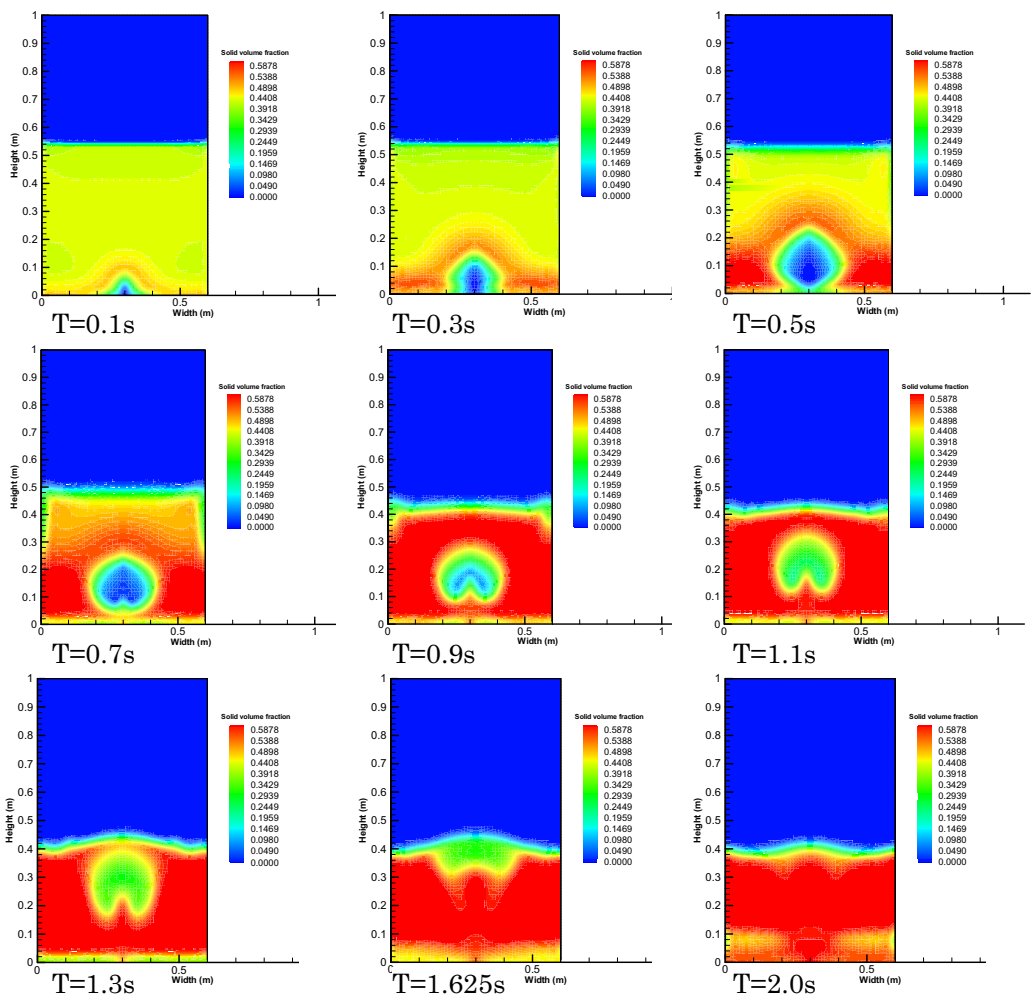

Fig. 1. The numerical results of the formation, rise and cracking of a bubble.

A two-dimensional air-fluidized bed of 600 mm width and 1000 mm height was studied to investigate the formation, rise and cracking process of a bubble. The particles were assumed to be regular round particles of diameter 4 mm. The RNG k-ε model was employed for the turbulence, and the time integration scheme is the first order implicit difference with the time-step 0.0001 s. The equations were spatially discretized by the finite volume method, and the SIMPLE algorithm was used to solve the pressure-velocity of fluid.

It is found in Fig. 1 that when the bubble rises, part of the gas remains inside the bubble, while some other gas escapes from the bubble at the top arch, then passes through the emulsification layer surrounding the bubble, and finally returns into the bubble at the bottom side to form a cycle around the bubble. The motion and mixture of particles in the air-fluidized bed are mainly caused by the motion of bubble.

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