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A numerical study of bubble pinch-off SHAOPING QUAN, Institute of High Performance Computing, Singapore 117528, JINSONG HUA, Institute of High Performace Computing, Singapore 117528 — The buoyancy-driven less viscous bubble pinch-off immersed in another more viscous fluid is numerically studied. The radius of the neck region is found to decrease in a power law mode $R \sim \tau^{\alpha}$, and the exponent α is between $0.5-1.0$ for a large range of the fluids' properties. These are in a good agreement with the previous available investigations. The effect of the liquid viscosity on the bubble pinch-off is investigated, and it is found that the viscosity has significant effect on the dynamics of the bubble pinch-off. A higher viscosity in the continuous phase results in slower pinch-off and a larger bubble. Then, we find that the surface tension tends to retard the pinch-off process and to generate large bubble. Finally, it is showed that, unlike the viscosity and surface tension, the density has minimal effect on the necking process and the bubble volume. Previous experimental results showed that there is a sharp change for the exponent for a viscosity of 20-70cP, while our numerical prediction shows a rather smooth transition and the transition happens at a viscosity bigger than 68cP which corresponds the Archimedes (Ar) number of $\mathcal{O}(\infty)$. As the viscosity and surface tension affect the exponent in a significant way while density does not, we could explain that the difference is due to the variation of the surface tension coefficients in the experiments.

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