

Supplemental material

Phase diagrams

Two phase diagrams of SF_6 are reported in Fig. 1. Along the liquid-gas coexistence curve, we vary $T_m \in [25, 45]^\circ\text{C}$, that is $\epsilon \in [0.0016, 0.064]$. In this regime, the density difference between the two phases remains significantly larger than the fluctuations of the mean density in the system of interest, see Fig. 1 (right). In the supercritical domain, $T_m \in [46, 55]^\circ\text{C}$, i.e., $\epsilon \in [0.0016, 0.03]$: all of the fluid in the container is present in a single phase.

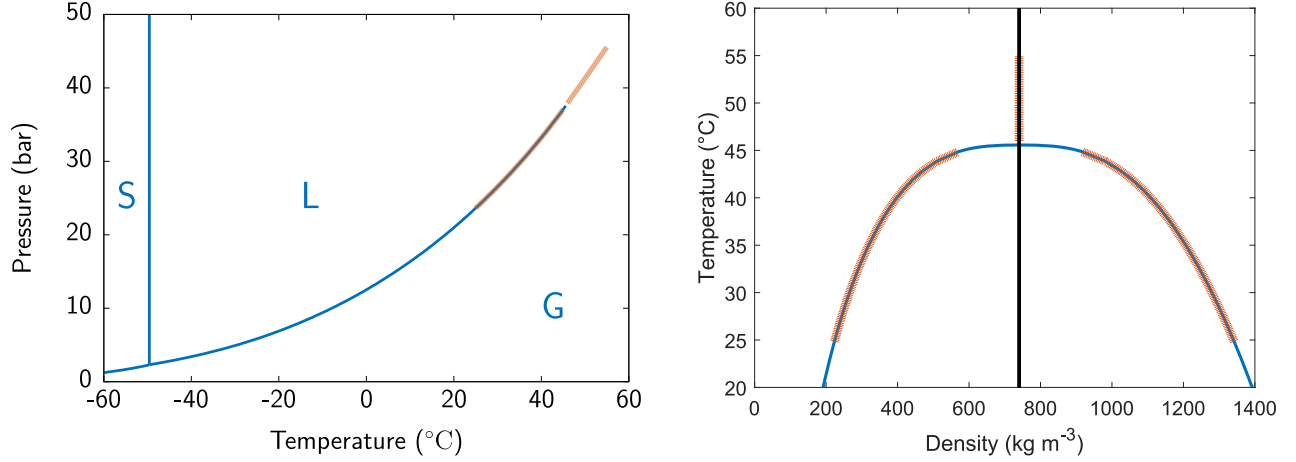


FIG. 1. Phase diagrams of SF_6 with the investigated range shown as red dashed lines. (Left) Pressure–temperature phase diagram: “S”, “L” and “G” respectively stand for solid, liquid and gas. (Right) Temperature–density phase diagram: the vertical black line corresponds to the mean density (its width shows the fluctuation range in the system of interest).

Additional data

In the manuscript, a mean volumetric flux $\Phi_v = \langle v \rangle N_b \langle r_b^3 \rangle$ is defined to characterize N_b rising bubbles of mean rise velocity $\langle v \rangle$ and volume $(4\pi/3)\langle r_b^3 \rangle$. This quantity scales as $\Phi_v \propto \epsilon^{-1.3} \Delta T^2$ and therefore diverges as the critical point is approached ($\epsilon \rightarrow 0$). In the main document, Fig. 7 shows that the mean volume increases for a fixed ΔT as $\epsilon \rightarrow 0$. Here, Fig. 2 reports the behavior of $\langle v \rangle$ and N_b as a function of ΔT for various values of ϵ . It appears that $\langle v \rangle$ is an increasing function of ΔT that only marginally depends of ϵ . The data for N_b are reported for completeness but are quite scattered and do not evidence any clear correlation. It however suggests that N_b increases with ΔT and T_m (and therefore decreases with ϵ).

All these results indicate that the heat fluxes diverges close to the critical point as a function of a rapid increase of the number and size of the nucleated bubbles.

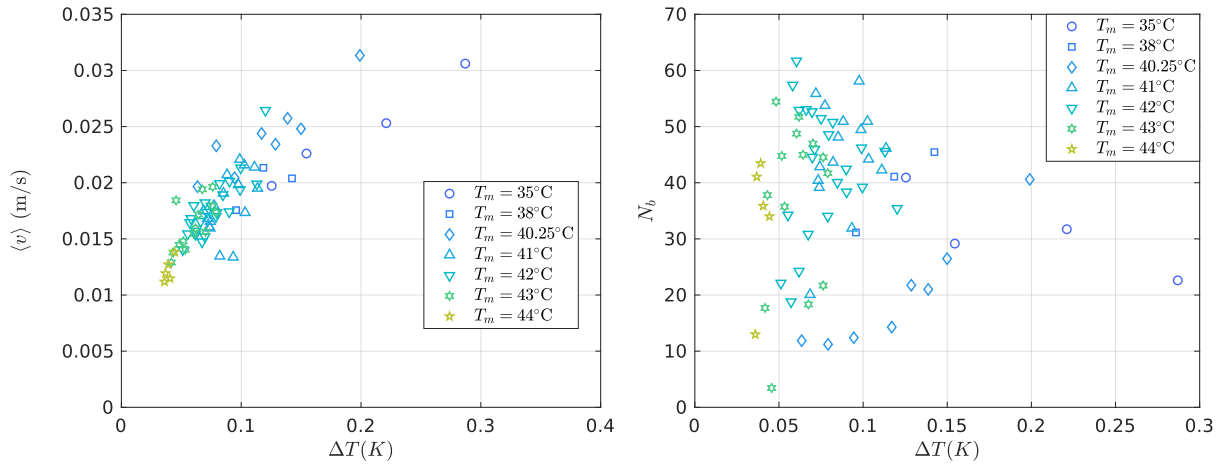


FIG. 2. Mean rise velocity (left) and number of bubbles (right) as a function of the mean temperature difference ΔT .