Abstract Submitted
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Bubble dynamics in a Hele-Shaw cell SAUL PIEDRA, EDUARDO RAMOS, CIE-UNAM — We study theoretically the dynamics of air bubbles ascending in a water filled Hele-Shaw cell. The bubble position and shape, and the flow inside and outside the bubble are calculated by solving a two-dimensional model that comprises the mass and momentum conservation equations coupled with a front tracking technique. The shape of the bubble is determined by the motion of the water surrounding the bubble, and the surface tension. The effect of the walls of the Hele-Shaw cell is accounted for in the model by including a brake term proportional to the corresponding component of the bubble centroid velocity in the momentum conservation equation. The proportionality constant is a free parameter. We find that the bubbles follow a zigzag trajectory as they ascend. The bubbles acquire elliptic shapes that oscillate $\pm 45^\circ$ around their geometrical center, with the largest inclination angle at the turning points of the zigzag motion. Also, the bubbles take a larger eccentricity at the same positions. The Reynolds number of the bubbles is 372 and vortex shedding is observed. All dynamical properties are in quantitative agreement with experimental results.

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