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## The Rising Behaviors of Single Bubbles in Stagnant Turpentine and Pine Resin Solutions

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**ABSTRACT:** Rise characteristics of single bubbles with diameters ranging from 0.5 to 4.0 mm in turpentine and pine resin were visually observed at 25 °C by the techniques of high-speed photography and digital image analysis. Despite its widely use in chemical engineering and others, the researches about pine resin on gas-liquid two phase flow is far from being solved. The purpose of the present paper is to assess the moving characteristics of single bubble in turpentine and pine resin solutions. The bubbles rise along a rectilinear path when the diameter  $d \leq 1$  mm. The amplitude of the trajectory oscillation becomes weaker with the increase of the solution concentration. Bubble trajectory closely related to liquid viscosity and bubble diameter. The bubble rise velocity increased with bubble size to a maximum value, after which the velocity fell slowly with further increases in the bubble size. Measured rising velocities of single bubbles were compared with typical correlations. The comparison showed that the model by Tomiyama et al. (1998) gives a good prediction almost throughout the observed range, though it tends to slightly overestimate the data for small bubbles. The physics of the Tomiyama model were discussed.

**Keywords:** Single bubble; Trajectory; Rising velocity; Turpentine; Pine resin

### 1. Introduction

Gas–liquid two–phase flows are frequently encountered in industrial processes, such

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