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Shubhankar Chakraborty, Prasanta Kr. Das

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# Model based reconstruction of an axisymmetric moving void using multiple conductivity probes

Shubhankar Chakraborty[a], Prasanta Kr. Das[a,*]

[a]*Department of Mechanical Engineering, Indian Institute of Technology Kharagpur, India, 721302*

**Abstract**

A novel technique has been proposed to reconstruct the shape of a Taylor bubble rising through a column of stagnant liquid using measurements from two conductivity probes placed in tandem. The resistance measured from the arc type conductivity probes, flush mounted on the inner wall of the tube, is indicative of the instantaneous void geometry. A two-dimensional modelling of the electric field has been employed to find out the voidage profile. The velocity of the bubble is also estimated from the response of the two probes. Finally, combining the instantaneous void profiles and the bubble velocity, the bubble shape has been reconstructed. A comparison between the reconstructed bubble shape and its refraction corrected image gives a reasonable match in shape and volume. An elaborate assessment has also been made to pinpoint different errors in the measurement scheme.

*Keywords:* Taylor bubble; conductivity probe; guard electrode; refraction correction; shape reconstruction



*Corresponding author

*Email addresses:* shubhankar@mech.iitkgp.ernet.in (Shubhankar Chakraborty), pkd@mech.iitkgp.ernet.in (Prasanta Kr. Das)