

Air - Water Flow in a Rock&Roll Ring Flow Loop: Visualization and Modeling

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Understanding the interdependence between flow morphology and hydrate formation is essential for the safe and efficient transport of multiphase flow systems along pipelines. This work is an initial milestone in the development of experimental and analytical tools for studying the formation and flow of gas hydrates in curved pipes. The scientific problem underlying this effort is whether the methodologies used to solve the horizontal multiphase flow can be extended to the present geometry.

This talk firstly aimed to show the main outcomes of an experimental study of air-water flow under Rock&Roll ring flow loop (Fig. 1a) conditions: flow patterns and flow regime map (Fig. 1b). The results of estimating the volume of air bubbles trapped in the liquid, attained by image processing of flow snap shots will be then discussed. After, an explanation of the idea of energy minimization model¹ is followed. The accuracy of the model evaluated by comparing simulation results with experimental results. Finally, the advantages and future prospects of actual experimental setup for multiphase flow applications will be pointed out.

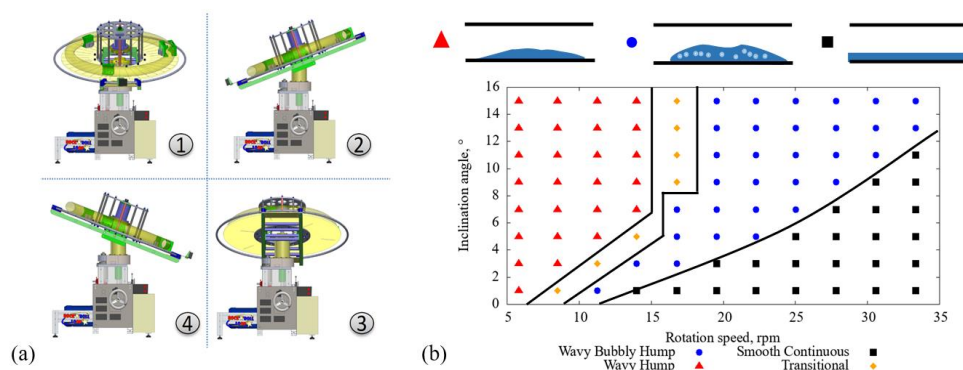


Figure 1 – (a) 3D model of Rock&Roll Ring Flow Loop inclined in four positions,
(b) Air-water two phase flow regime map (5% WC, 5° rocking angle)