



THREE-DIMENSIONAL BUBBLE-VELOCITY DETERMINATION ALGORITHM WITH WIRE-MESH SENSOR

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Visualization method: wire mesh sensor

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ABSTRACT: A gas-liquid two-phase flow in a large diameter pipe exhibits complex three-dimensional flow structures. Wire-Mesh Sensor (WMS) consists of one parallel wire layer and another parallel wire layer intersecting at right angles. Fig. 1 shows a schematic of the WMS used in this study. The WMS measures instantaneous two-dimensional void-fraction distribution on the pipe cross-section, according to the electric conductance between two intersecting wires in a two-phase flow. WMS can also acquire a phasic-velocity on the basis of the time lag of void signals between two sets of WMS. In past, the acquired phasic velocity was limited to one-dimensional. The authors propose a algorithm to estimate the three-dimensional bubble-velocity according to each WMS measurement locations. The three-dimensional phasic-velocity is determined by the tracing bubble. The proposed algorithm first identifies each bubble in the WMS signals. Then, it seeks pairs of resemble bubble in two WMS data according to the bubble size and location (see Fig.2). The validity of this method is demonstrated for a swirl flow. The proposed method can successfully visualize a swirl flow structure.

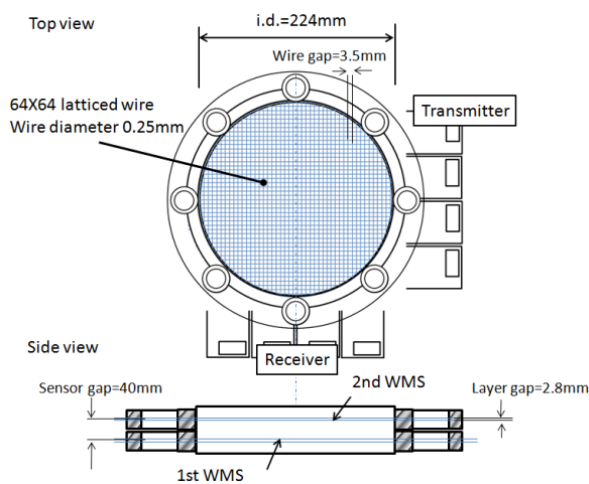


Fig. 1 Schematics of WMS

Inner diameter is 224 mm (equal to the test pipe), consist of 64 parallel wires by 64. The distance between the wires (layer gap distance) is 3.5 mm. The distance between two WMS sets is 40 mm.

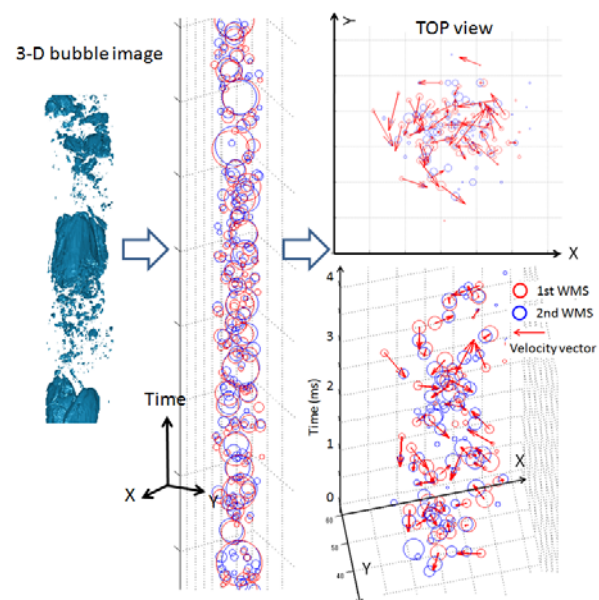


Fig. 2 Bubble velocity and size determined the proposed method

Reference

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