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Aspect ratio estimate using four-point fiber-optical probe

Abstract

Fiber optical probes provide accurate measurements of bubbly flows, e.g. the local void fraction or the velocity of the gas phase. We propose a new algorithm to estimate the bubbles' aspect ratio from the time series obtained by a four point optical fiber probe. To obtain the aspect ratio we used a mathematical model of the bubble-probe interaction. The accuracy and the robustness of the algorithm is analyzed for bubbles with an equivalent diameter of 2-4 mm using both synthetic and experimental data. The experimental data is obtained by means of stereoscopic high speed imaging. We provide an algorithm to extract the aspect ratio from the high speed images, that reconstructs the three dimensional shape of the bubble from a set of stereoscopic contour lines.

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