

## Enhanced Calibration Map for a Four-Hole Probe for Measuring High Flow Angles

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**Abstract :** This research explains and compares the modern techniques used for measuring the flow angles of a flowing fluid with the traditional technique of using multi-hole pressure probes. In particular, the focus of the study is on four-hole probes, which offer great reliability and benefits in several applications where the use of modern measurement techniques is either inconvenient or impractical. Due to modern advancements in manufacturing, small multi-hole pressure probes can be made with high precision, which eliminates the need for calibrating every manufactured probe. This study aims to improve the range of calibration maps for a four-hole probe to allow high flow angles to be measured accurately. The research methodology comprises a literature review of the successful calibration definitions that have been implemented on five-hole probes. These definitions are then adapted and applied on a four-hole probe using a set of raw pressures data. A comparison of the different definitions will be carried out in Matlab and the results will be analyzed to determine the best calibration definition. Taking simplicity of implementation into account as well as the reliability of flow angles estimation, an adapted technique from a research paper written in 2002 offered the most promising outcome. Consequently, the method is seen as a good enhancement for four-hole probes and it can substitute for the existing calibration definitions that offer less accuracy.

**Keywords :** calibration definitions, calibration maps, flow measurement techniques, four-hole probes, multi-hole pressure probes

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