LOOK UP TABLE METHOD FOR FIVE HOLE PROBE DATA REDUCTION

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Abstract

A lookup method for extracting flow field information from five hole probe measurements is presented. The look up table method consists of two step interpolation. In the first step, the calibration space is divided into a large number of small intervals of yaw and pitch coefficients (0.1, 0.05 or 0.01) and the required quantities are interpolated using local cubic spline interpolation technique. The interpolated values are stored in a large square matrix. In the second step, the measured values of yaw and pitch coefficients are used to determine yaw and pitch angles by linear interpolation. Same procedure is used to determine total and static pressure coefficients. Additional data taken during the calibration is used for validating lookup table method and spline interpolation method. The errors from the look up table method, particularly with the interval of 0.01 are about the same or lower than those obtained from the spline interpolation method. The computational times for lookup table method are found to be lower than that for the spline interpolation method. The lookup table method seems to be attractive when a large amount of five hole probe data is to be processed and in cases where online data processing is required.

Keywords: Five Hole Probe, Non-nulling Calibration, Lookup Table Method, Spline Interpolation Method, Interpolation Errors