

Abstract Submitted
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A Study of Surface-Pressure Estimation from Multiline Molecular Tagging Velocimetry Data¹ AHMED NAGUIB, MANOOCH EHR KOOCHESFAHANI, Michigan State University — This study is motivated by the extraction of surface-pressure information from Molecular Tagging Velocimetry (MTV) data in order to correlate unsteady flow structures with surface forces. The approach we take is to integrate the pressure-gradient acting on the wall, which for a stationary surface can be computed from knowledge of the wall vorticity flux. The latter requires calculation of the second derivative of the velocity at the wall, which is generally difficult to estimate accurately from near-wall velocity data. In this work, we seek to address this issue by capitalizing on the unique ability of MTV to provide very fine resolution of single-velocity-component data near the wall. The accuracy of determining the wall vorticity flux (and surface pressure) from such measurements is examined using theoretical solutions of simple flows and numerical databases. The results provide a guide for the selection of the measurement parameters for accurate implementation of the method, as well as shed light on the practical limits of its applicability.

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