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PIV Driven Computational Flow Simulation JOHN CHARONKO, PAVLOS VLACHOS, Virginia Tech — PIV is a well-accepted non-invasive technique capable of time-resolved velocity measurements. However, in order to obtain good temporal or spatial resolution in a particular region, more global measurement of the flow must often be sacrificed. A new method has been developed to integrate planar PIV measurements of incompressible flows into a 2D CFD solver so that the computational results remain synchronized with and guided by the experimental data. This allows extrapolation of the flow outside the measured area. Simultaneously, this method utilizes established methods for deriving pressure field data from velocity measurements in a new way to obtain time-resolved pressures without the need for a known reference within the experimental domain. The procedure has been tested with various analytical and experimental flow fields and has shown good agreement with expected results. It is believed that this method may prove useful in reconstructing the velocity distribution in regions of the flow obstructed from view. Finally, it suggests the possibility of designing an experiment so that regions of the flow which are challenging to simulate numerically (such as separation and transition) can be measured experimentally, while the remainder can be simulated using CFD techniques.

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