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In-Cylinder IC Engine Velocity Measurements using Stereoscopic Molecular Tagging Velocimetry REZA SADR, Texas A&M University at Qatar, MAYANK MITTAL, HAROLD SCHOCK, Michigan State University — In-Cylinder velocity field measurement is of great importance for research aimed at improvement in fuel efficiency and reduction of emissions in internal combustion (IC) engines. Application of more conventional fluid velocimetry techniques for IC measurements is, however, limited due to complex flow condition and mechanical set up in IC engines. Stereoscopic Molecular Tagging Velocimetry (SMTV) technique is used to obtain the multiple point measurement of an instantaneous three dimensional velocity field in an IC engine assembly. A novel image processing technique is implemented to obtain the velocity data. The new algorithm is computationally less expensive and eliminates the need for geometric details in earlier techniques to obtain the three-dimensional velocity components. Cycle-to-cycle variations of three dimensional velocity field and out-of-plane vorticity are presented inside the engine cylinder for three different crank angle degrees (CAD) of 90° , 180° , and 270° . Preliminary results show high cycle-to-cycle variations in the out-of-plane velocity component but less variation is observed in the velocity component along the cylinder axis. The flow has fully three-dimensional unsteady behavior during the intake stroke; however the variations are less during the compression stroke.

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