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Turbulence averaging techniques for IC engine unsteady flow using Laser Doppler Velocimetry[1] PHILIP SCHINETSKY, SEMIH OLCMEN, MEBOUGNA DRABO, MARCUS ASHFORD, University of Alabama — Turbulence in unsteady flow fields is complex in nature not only because of the cycle-to-cycle variations of the turbulence but also the time dependent mean velocity. Defining and quantifying turbulence in unsteady flow fields is important since the level of turbulence applies directly to processes such as the mixing of gasoline and air in internal combustion engines. This same analysis method can also be used in fields where unsteady time-dependent data is obtained. In this study one component LDV velocity measurements made in an off the shelf IC engine were used to study unsteady turbulence. Phase and cyclic averaging techniques, along with wavelet transform analysis techniques were used to determine the unsteady turbulence levels. In addition, these techniques were applied to a predetermined sinusoidal signal with a known turbulence level to choose the best method to identify turbulence in unsteady flows.

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