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**Megahertz rate Schlieren visualization of underexpanded, impinging jet using pulsed high power LED** CHRISTIAN WILLERT, German Aerospace Center (DLR), DANIEL MITCHELL, JULIO SORIA, LTRAC, Monash University — Recent advances in light emitting diode (LED) technology has resulted in high power, single chip devices that provide luminous radiant fluxes exceeding several watts. Operated in pulsed current mode the instantaneous light emission of an LED can be further increased to levels comparable to that of photographic (xenon) flash units making it a suitable light source for Schlieren imaging. Compared to the commonly used xenon flash units an LED can be triggered within tens of nanoseconds at rise times on the order of 100 ns thereby enabling stroboscopic illumination at megahertz rates. In the present application the LED's driving electronics were synchronized to a high speed camera to provide time-resolved Schlieren images of an underexpanded free jet impinging on a flat plate (nozzle pressure ratio 2.0 to 5.2). The LED was pulsed in burst mode for 102 images at currents of up to 120 A at 500 ns per pulse. Compared to images obtained with a xenon white light flash the nearly monochromatic green light of the LED results in much crisper flow features with superior repeatability in intensity without any speckle artifacts commonly found with laser illumination.

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