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Development of a Kilo-Hertz Particle Image Velocimetry System Using LED's JIM CRAFTON, LARRY GOSS, JORDIE ESTEVADEORDAL, Innovative Scientific Solutions, Inc — PARTICLE SHADOW VELOCIMETRY (PSV) is a velocity measurement technique similar to PIV. PSV utilizes low-power pulsed light sources, such as an LED, to measure the displacement of seed particles in a flow. This is accomplished by imaging the extinction of light by the particles in the flow rather than the scattering, thus the power requirements of the lighting are significantly reduced. Data analysis involves cross-correlation of images at known time intervals to determine velocity. The use of LEDs' as a light source provides several advantages, among these are repetitive pulses in a single frame for particle tracking, the use of color to eliminate the need for cross-correlation cameras, and a significant reduction in equipment cost relative to lasers. Volumetric illumination eliminates the strong reflections from surfaces that often saturates the camera near the surface in traditional PIV thus allowing measurements to be made as close as 10-micrometers to a surface. This method is most applicable to liquid flows, near surfaces, and for small fields of view. Results are presented for several flows including kHz data in valves and artificial hearts.

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