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## Laser-Doppler Velocimetry: 2010 updates for a classic technique

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*AUR LDV's make obtaining useful flow velocities time and cost efficient.*

Applied University Research, Inc.

**Step up to advanced-technology instruments for detailed flow velocity measurements.**

- Flow speeds 0 + Mach = 24, including separated and vertical regimes.
- Flow temperatures from -110°F to more than 1000°F
- Measurements within 10.00µm of a surface.
- Miniature laser-Doppler probes measure three components of flow velocity with 5 µm spatial resolution without disturbing the flow.
- Robust, proven three-velocity component probes smaller than ping-pong and shoot digital cameras = 1 inch! In wide wind and water tunnel models and full-scale components.
- Remote control and laser fiber optic cables = 100m.
- Wide range of facilities, even large production facilities.
- Probe configurations to meet any need.
- Flow seeding solutions for all facilities and fluids.
- Exclusive technologies adaptable to your applications.
- Robust systems overcome limitations of other technologies.

Examine AUR Stable™ is the most advanced laser-Doppler burst signal processing software available.

Contact us to discuss your requirements: [www.aurinc.com](http://www.aurinc.com)  
[aur@aurinc.com](mailto:aur@aurinc.com)  
Ph: 540.797.0643

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CORPORATE MEMBER

Many have experienced the exacerbation of firing up an aging laser-Doppler velocimeter/anemometer (LDV), and all of its attendant support hardware, only to find that major work was in order to make the system operational. Maybe the bulky, inefficient ion laser was far out of alignment or the signal processing unit could not be interfaced with your facility host computer.

Worse yet, perhaps the laser tube was long out of commission or the uni-tasking processing unit would not even boot up. We frequently hear about similar issues with aging LDV equipment.

By implementing 2010 technology and unmatched experience, such problems are a thing of the past with AUR's high performance LDV systems. Here are some examples of past issues and AUR's solutions that make our systems workhorses of today's advanced flow facilities:

**Issue:** Instrument set-up is time consuming and difficult.

**Solutions:** Stable-pointing diode-pumped solid state (DPSS) lasers, precision thermal control, superior mechanical design and intuitive, robust control software

## AUR Product Highlights

- Miniature Position Resolving Three-velocity component LDV: A first in the world



- AUR Studio LDV Burst Processor



- SM3LDV



yield a system that requires a minimum of instrument setup. In most cases, simply mount the probe and begin measurements.

**Issue:** LDV measurements are time consuming for the amount of information gained.

**Solutions:** AUR's LDV systems offer automated operation, the highest *valid* data rates and advanced data post-processing options that reduce measurement time and effort and enhance the interpretation of the information available in the data.

**Issue:** LDV particle seeding is messy, cumbersome, fickle and a source of uncertainty.

**Solutions:** AUR will analyze your facility to provide the best seeding materials and generation methods to meet your needs. We offer the VAPCON, a carefully controlled vaporization/condensation seeder, for extremely narrow particle size distributions ( $\pm 12\%$  of the mean diameter bounds most of the particles), taking the guessing out of particle response in complex flows. We also have extensive experience seeding and measuring separating flows with intense shear layers and will offer this experience in specifying the solutions for your applications. We can also specify seeding for high temperature flows!

**Issue:** LDV fails where access through curved walls is required.

**Solutions:** AUR is the world leader in making velocity measurements through curved facility walls, making use of two technologies. First, AUR personnel have used thin shell windows in low-to-moderate dynamic pressure flows for many years with great success. Our ultra-miniaturized SM3LDV probe may be located inside of models under test and peer up two 1.18" out from the model to measure the crucial details of complex flows over three-dimensional surfaces. Further, our 'Comprehensive' LDV technologies allow customers to measure entire profiles of velocities without traversing the probe! For cylindrical windows, entire planes of data may be obtained by traversing parallel to the cylinder axis. No other manufacturer offers these capabilities.

**Issue:** Complicated and bulky multiple-color systems.  
**Solutions:** AUR's newest generation of LDV systems offers three-velocity-component measurements using a single nominal laser wavelength (532nm)! State-of-the-art photonics design and integration leads to a simple single photodetector configuration. The benefit of this simplicity is greater efficiency in photodetection, fewer optical and fiber optic components, and the ability to use robust, high powered, advanced DPSS lasers operating at 532nm.

**Issue:** Quirky, uni-tasking signal processing and data acquisition hardware.

**Solutions:** AUR Studio, our ultra-configurable measurement and automation software, is LDV measurement-ready with the most advanced burst processing suite in use today. With the LabView option, the system may be integrated into your complex experimental control VT's with ease. The PC-based unit gives you control over the measurement process and is re-configurable for other measurements or instruments as needed. Templates for 'modules', the processing workhorses of AUR Studio, are supplied with all units for end-user custom processing and post-processing applications.

## About AUR:

Applied University Research, Inc. develops advanced technologies for flow velocimetry and control. Founded by Dr. Roger L. Simpson, a prominent researcher in turbulent flow mechanics and instrumentation for over 35 years and past president of AIAA, AUR leverages unique capabilities and knowledge to deliver solutions to flow problems.



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