A Low-Profile Flow Shear Sensing Unit

Tech ID: 25942 / UC Case 2016-303-0

SUMMARY

UCLA researchers have developed an accurate low-profile shear sensing unit that is viable for both gas and liquid flows.

INNOVATION

UCLA researchers have developed a low-profile sensing unit that measures the shear stress of fluid flows in a direct manner. The unit suspends a plate with micro-flexures and reads its displacement with an optical encoder through innovative engineering that produces high sensitivity, accuracy, and spatial and temporal resolution. The unit is immune to electromagnetic interference and is valid for repeated use in any fluids, including both air and water.

APPLICATIONS

- Aerospace and aeronautical skin friction measurements
- Hydrodynamic skin friction measurements
- Complex flow measurements
- Signal feedback
- Drag determinations of man-made structures

ADVANTAGES

- Low profile to imbed into the wall surface
- High sensitivity and accuracy
- High spatial and temporal resolution
- Immune to pressure and temperature variations
- Immune to electromagnetic interference
- Can be used repeatedly

STATE OF DEVELOPMENT

The invention has been successfully prototyped and demonstrated. Variations of units have been developed and actively being used for internal projects.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,983,111	05/29/2018	2016-303

RELATED MATERIALS

▶ Bao, Xiaoqi, et al. "Sensor for direct measurement of the boundary shear stress in fluid flow." SPIE Smart Structures and Materials+ Nondestructive Evaluation and Health Monitoring. International Society for Optics and Photonics, 2011.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

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OTHER INFORMATION

KEYWORDS

Shear, drag, flow, skin friction, low profile, fluid mechanics, optical encoder, floating unit, turbulent flow, viscous, boundary layer, drag reduction, aerodynamic

CATEGORIZED AS

- ▶ **Biotechnology**
  - ▶ Industrial/ Energy
- ▶ **Energy**
  - ▶ Other
  - ▶ Wind
- ▶ **Materials & Chemicals**
  - ▶ Thin Films
- ▶ **Sensors & Instrumentation**
  - ▶ Physical Measurement
  - ▶ Process Control
- ▶ **Transportation**
  - ▶ Aerospace
  - ▶ Alternative Propulsion
  - ▶ Automotive
  - ▶ Other

RELATED CASES

2016-303-0

- Methods of Restoring and Maintaining Gas Film on Superhydrophobic Surfaces while Underwater
- Complete Transfer of Liquid Drops by Modification of Nozzle Design
- Stereo Image Acquisition By Lens Translation
- Method of Fluid Manipulation By Electrodewetting
- A Built-In Mechanism Of Gas Maintenance In Microfeatures On A Submerged Surface
- No-Assembly Devices for Microfluidics Inside a Cavity
- Liquid-Repellent Surfaces Made of Any Materials
- On-chip, Real-time Feedback Control for Electrical Manipulation of Droplets
- Micropumping of Liquids by Directional Growth and Selective Venting of Bubbles
- Microstructured Cathode for Self-Regulated Oxygen Generation and Consumption

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