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Battelle Number(s):

11760-E, 12817-B

Patent(s) Issued

Available for licensing in all fields

Available Technologies

Velocity Profile and Rheology of Flowing Fluids and Slurries

SUMMARY

Rheological and physical property information on process stream conditions are critical when maintaining product quality and avoiding process upsets. There are tremendous practical and cost benefits in continuously characterizing process streams compared with direct sampling and off-line measurements. Researchers at PNNL have developed an ultrasonic rheometer based on range-gated Doppler analysis combined with other ultrasonic signal features that provides non-disruptive rheological and physical property measurements. The technology has been successfully demonstrated on a shear thinning fluid flowing at nominal velocities of 0.1 to 1 meter/sec in pipe diameters of 2-inches and larger. The device employs advances in signal processing, sensors, and miniaturized electronics to provide non-invasive, real-time capabilities for continuous monitoring of key physical properties of liquids and slurries. This device can be used to monitor a myriad of process streams including polymer manufacturing, food processing, consumer products and hazardous waste slurries. PNNL has tested the technique on shear thinning gel, food sauces, shampoos, and process milling solutions.

ADVANTAGES

- * PNNL device is practical and economical for most manufacturing applications, serving to integrate interface detection, concentration measurements, and rheology measurements into a single ultrasonic monitoring unit.
- * Multi-transducer configuration allows for operation on a wide range of materials and design offers novel performance features in terms of automation and resolution, maintaining accurate velocity measurements over a wide range of flow rates.
- * In addition to characterization, this technology can track, in real-time, pipe wall deposits, fouling and plugging.

RELATED LINKS

- » **Macro Property Measurement Website: Acoustic Evaluation of Liquids in Containers**

<http://www.technet.pnl.gov/sensors/macro/projects/es4upecw.stm>



Patents & Intellectual Property

- » Patent #: 6,067,861
- » Patent #: 6,871,148

Technology Portfolio(s)

- » Ultrasonics
- » Physical Sensors

Potential Industry Applications

- » Agriculture & Mining
- » Chemicals
- » Energy & Utilities
- » Food, Beverage & Tobacco
- » Healthcare, Pharma, Biotech & Medical
- » Manufacturing & Warehousing
- » Oil & Gas
- » Recycling & Waste Management
- » Wood, Paper & Forestry

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