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Battelle Number(s):

13377-B

Patent(s) Issued

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Available Technologies

Ultrasonic Liquid Level Monitor

SUMMARY

Researchers at PNNL have developed and validated a novel concept for an ultrasonic liquid level monitor that is responsive to the market need for a low cost, non-invasive ultrasonic device to monitor a liquid's level that can be easily installed, maintained and operated.

The concept is comprised of a single transducer mounted to the outside surface of the side of a tank. The single transducer that generates acoustic burst signals with transverse and oblique propagation paths. The time-of-flights of the different echoes depend upon the liquid composition, liquid temperature and the level of the liquid surface. The monitor continuously self-calibrates to account for temperature and composition changes for fill level determinations.

The liquid level is estimated from these time-of-flights using a physical model and rigorous mathematical algorithm. The estimation algorithm relies on the markedly larger echoes that return from the corner reflectors formed at the interface of the liquid surface and the tank sidewalls.

ADVANTAGES

This monitor has several important features that distinguishes it from other available monitors, including:

- corner-shot physics model uses oblique angle operation vs. normal to the surface operation,
- external single sensor is side-mounted rather than on the bottom or top or inside of the tank,
- cost-effective potential single-transducer pulse-echo operation vs. multiple-transducer pitch-catch / pulse-echo operation, and
- self-calibrating mechanism accounts for differences in the densities and temperature of the various liquids a tank may contain over time.

RELATED LINKS

- » [Posting on Federal Business Opportunities Site](#)

<http://www.fbo.gov/servlet/Documents/R/901287>

- » [Macro Property Measurement Website: Acoustic Evaluation of Liquids in](#)



Containers

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

Patents & Intellectual Property

- » Patent #: 6,925,870

Technology Portfolio(s)

- » Ultrasonics
- » Physical Sensors

Potential Industry Applications

- » Agriculture & Mining
- » Automotive & Transportation
- » Chemicals
- » Consumer Products
- » Energy & Utilities
- » Food, Beverage & Tobacco
- » Healthcare, Pharma, Biotech & Medical
- » Manufacturing & Warehousing
- » Oil & Gas
- » Recycling & Waste Management
- » Security

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