

Acoustic Identification of Unknown Fluids

Executive Overview:

Scientists at Los Alamos National Laboratory (LANL) have developed a unique sound-based technique, called Swept Frequency Acoustic Interferometry (SFAI), that can be used to identify unknown fluids using their specific acoustic properties. LANL originally developed this technology as a method for identifying chemical warfare agents; however, it has numerous applications in the commercial world, from identifying toxic substances at dump sites to looking for infections in blood samples.

Different fluids transmit sound waves differently depending on the fluid's absorption of sound and the speed at which it conducts sound. The sound, or resonance frequency, at which transmission peaks is unique to every fluid. By interrogating an unknown fluid with a range of high frequency sound waves, it is possible to find the fluid's resonance frequency, and thus its identity, by studying the acoustic transmission data. This method can be used to distinguish different components in a fluid mixture and identify particles suspended in a fluid based on how they affect the fluid's sound transmission. By directing sound waves through the wall of a fluid-filled container, the fluid can be identified without opening the container. This data can also be used to determine the fluid level inside the container as well as its viscosity and density. LANL's scientific team has been able to interrogate containers from up to 15 feet away, enabling remote interrogation.

LANL is now looking for partners to develop and deploy the commercial applications of SFAI. By working with LANL, companies gain access to this highly innovative technology while minimizing R&D risks and expenditures.

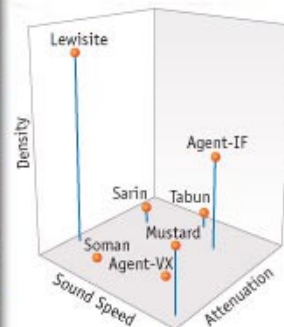
Select Acoustic Interferometry IP:

LANL holds 16 patents and numerous patent applications for this technology. Below is a select listing of some of these patents.

- Apparatus and Method for Comparing Corresponding Acoustic Resonances in Liquids [US patent 5,886,262]
- Ultrasonic Characterization of Single Drops of Liquid [US patent 5,739,432]
- Noninvasive Method for Determining the Liquid Level and Density Inside of a Container [US patent 6,053,041]
- Noninvasive Identification of Fluids by Swept-Frequency Acoustic Interferometry [US patent 5,767,407]
- Apparatus and Method for Remote, Noninvasive Characterization of Structures and Fluids Inside Containers [US patent 6,186,004]
- Cylindrical Acoustic Levitator/Concentrator Having Non-Circular Cross-Section [US patents 6,467,350 and 6,644,118]
- Noninvasive Characterization of a Flowing Multiphase Fluid Using Ultrasonic Interferometry [US patent 6,644,119]

Partnership Mechanisms:

- Licensing Agreements
- Non-Federal Work-for-Others Agreements (WFO)
- Cooperative Research and Development Agreements (CRADA)



Many common chemical warfare agents can be uniquely identified by comparing three parameters derived from resonance-spectrum data: Liquid density, sound speed, and sound attenuation.

Select Applications:

Homeland security
Oil and gas industry
Food and beverage quality control
Medical diagnostic assays
Hazardous material Identification

Capabilities:

Identification of unknown fluids and particles
Determination of fluid volume, flow rate, and viscosity
Inspection of closed containers
Stand-off interrogation

Partner Benefits:

First mover advantage
Reduced cost of R&D
Reduced risk of R&D
Reduced development cycle
Design freedom (IP)

Web Links

www.lanl.gov/opportunities

Business Development Contact:

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