Acoustic Techniques for Characterizing Complex Flows

Techniques based on acoustics and ultrasound to measure the properties of complex mixtures

Category
Hardware

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Background

Many industrial processes require the handling of complex mixtures consisting of solid, liquid, and gas phases. These mixtures often involve two-phase reactions and separations. Current techniques often only measure general parameters, for example, pressure drop, which do not reveal details of the system. Existing techniques can also require visual access and transparent test sections and are only suitable at laboratory scales. Moreover, they can be expensive or have strict safety requirements.

Techniques that involve either listening to the sound waves produced by the mixture (Acoustics) or transmitting sound waves through it (Ultrasound) are powerful alternatives for measuring and controlling processes that involve complex mixtures. They are cost-effective, non-intrusive, and do not require transparent test sections and optical access. They are also suitable for different types of mixtures and can be used online for fast data collection. They enable control of complex processes. As a result, acoustic and ultrasound techniques are becoming increasingly popular for a wide range of industrial applications.

Technology Overview

Techniques based on acoustics and ultrasound to characterize the properties of complex mixtures have been developed. To measure the properties of the mixtures, instruments, and sensor probes are used to collect data. The data is post-processed using algorithms to create information.

University College London researchers have calculated important properties of complex mixtures, such as the volume fractions of the phases, the size of the dispersed particles or drops, and the velocity profiles of the phases. The techniques have been successfully applied to study mixtures containing solid, liquid, and gas phases, in both large and small-scale setups, including continuous flows and batch vessels.

Benefits

• Flexible, easy, cost-effective setup and signal postprocessing.

• Ability for fast online measurements, supporting process monitoring and control.

• Measurements of size in dispersed and particulate flows.

• Characterization of velocities and concentrations in multiphase systems.

Applications

The technology would be suitable for solid-liquid, solid-gas, and liquid-liquid systems where measurement of volume fraction, concentration profiles, velocity profiles, and particle or drop size distributions are needed. These are often used in:

• Oil Industry.

• Food Production.

• Pharmaceutical Industry.

• Energy applications.

Opportunity

University College London researchers are seeking a partner for commercial or licensing opportunities to further and broaden the development of the techniques and demonstrate their application to multiphase processing.

Seeking

Commercial partner,

Licensing

IP Status

Know-how based, Copyright

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