PURDUE INNOVATES | Office of Technology Commercialization

Impedance Meter Application for Volume Fraction, Flow Regime, and Flow Rate Measurement

Non-invasive impedance meter objectively classifies multiphase flow regimes for oil, gas, nuclear, and chemical systems.

Researchers at Purdue University have developed a method for visualizing two-phase flow systems. Traditionally, the classification of flow regimes has been dependent on subjective observations based on video from a high-speed camera. This results in classifications that vary between observers and can result in inaccurate understandings of flow properties. This method is also dependent on using transparent piping and maintaining proper lighting conditions, making it impractical for use in industrial settings. Using non-invasive impedance measurements, Purdue's technology offers an industrial solution to these limitations that offers a straight-forward way for industrial operators to understand the state of multi-phase flow processes. This technology has applications in processes where two phases (liquid and gas) enter a process together, where they previously could not have been measured independently. Additionally, previous approaches to analyze two-phase flow only horizontal and vertical flow directions; Purdue's method can analyze flow at inclines and declines. Applications for this technology include the oil and gas industry, nuclear power generation, and chemical processing.

Advantages:

- Straightforward visualization of the state of two-phase flows

- Removes subjectivity from the classification of flow regimes

- Based on non-invasive, impedance measurements

Applications:

- Oil and gas industry

- Nuclear power generation

- Chemical processing

Technology ID

2023-KIM-70022

Category

Semiconductors/IC Design & EDA Tools

Authors

David H Kang

Seungjin Kim

Drew McLane Ryan

Further information

Parag Vasekar

psvasekar@prf.org

View online

Technology Validation:

This technology has been validated through an analytical study of the concept.

Related Publications: Kang, D., Ryan, D., & Kim, S. (2024). RGB Mapping: A Dynamic Approach for Flow Pattern Identification and Classification. Nuclear Science and Engineering, 1â€“12. https://doi.org/10.1080/00295639.2024.2406719

TRL: 3

Intellectual Property:

Provisional-Patent, 2023-03-23, United States

Utility Patent, 2024-03-25, United States

Keywords: Flow Rate, Flow Visualization, Mechanical Engineering, Two-Phase Flow