A Multiphase Flow Measurement System Comprising an Impedance Cross Correlation (ICC) Device and an Imaging Electromagnetic Flow Meter (IEF).

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ABSTRACT

Flow measurements are playing increasingly important roles in many different application areas, such as manufacturing processes and the oil & gas industry. Multiphase flow measurement in particular is becoming increasingly important to the oil industry.
This project concerns the design and implementation of a two-phase flow measurement system which integrates an impedance cross correlation (ICC) flow meter - which can be utilized for measuring the local dispersed phase volume fraction distribution and the local dispersed phase velocity in a water continuous two phase flow (e.g. a solids-in-water flow) - with an imaging electromagnetic flow meter (IEF) that can measure the velocity profile of the conducting continuous-phase flow (water).
In order to implement the combination of the two flow measurement devices so that they are suitable for monitoring a two phase flow mathematical fusion functions must be analyzed. Additionally, with reference to the characteristics of the electronic hardware and signal processing methods used in the multi-electrode imaging electromagnetic flow meter and the impedance cross correlation flow meter, a control program for the combined system is being developed using a Labview software. The control hardware is based around an NI PCI-6254 unit which has 16-bit analogue to digital conversion resolution for data acquisition.
This PC based control system will allow all acquired to be stored. The Labview software will also be used to display results in real time including, for example, (i) the local water and solids volume fraction distributions, (ii) the local water and solids velocity profiles and (iii) the totalized solids and liquid volumetric flow rates.

Keywords multiphase velocity electromagnetic cross-correlation Labview