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WET GAS FLOW METERING TECHNIQUE USING A VENTURI WITH CONDUCTANCE SENSORS

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ABSTRACT

Wet gas metering is becoming an increasingly important problem to the oil and gas industry. The Venturi meter is a favoured device for the metering of the unprocessed wet natural gas production flows. Various combinations of techniques have been employed in annular gas-liquid two phase flows to measure the flow parameters (e.g. liquid film thickness, gas volume fraction and the phase flow rates). One of the most useful techniques which has proven attractive for many multiphase flow applications is the electrical conductance technique. The aim of this research program is to design a novel wet gas flow metering technique, which combines a Venturi with conductance sensors at the inlet and throat, then to find a novel technique for eliminating the dependency of the conductance sensors at inlet and throat on the conductivity of liquid phase. A digital liquid level sensor will be used to measure the liquid film thickness of the annular flow the digital liquid film thickness being used to help eliminate the dependency of the analogue conductance sensors on the conductivity of the flowing liquid phase. The measurement system will use a NI USB 6009 data acquisition device to integrate the system measurements and to control the operation of the device. A program will be created to read the input signals (from the throat conductance sensor; the digital level sensor; the inlet conductance sensor and the differential pressure sensor) and to calculate the device outputs (i.e. gas volumetric rate; gas mass flow rate; gas volume fraction; and water flow rate).

Keywords: Venturi meter, electrical conductance technique, annular