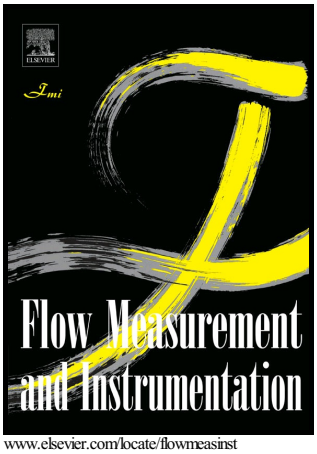

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Identification of liquid-gas flow regime in a pipeline using gamma-ray absorption technique and computational intelligence methods

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Abstract: Liquid-gas flows in pipelines occur frequently in the mining, nuclear, and oil industry. One of the non-contact techniques useful for studying such flows is the gamma ray absorption method. An analysis of the signals from scintillation detectors allows us to determine the number of flow parameters and to identify the flow structure.

In this work, four types of liquid-gas flow regimes as a slug, plug, bubble, and transitional plug – bubble were evaluated using computational intelligence methods. The experiments were carried out for water-air flow through a horizontal pipeline. A sealed Am-241 gamma ray source and a NaI(Tl) scintillation detector were used in the research. Based on the measuring signal analysis in the time domain, nine features were extracted which were used at the input of the classifier. Six computational intelligence methods (K-means clustering algorithm, single decision tree, probabilistic neural network, multilayer perceptron, radial

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