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UNIFORMITY OF SUBSTANCE FLOW, CONTACTLESS MEASUREMENTS

Background
Homogeneity of substance flow is often required to be determined so that to identify the kind and the nature of the flow depending on Reynolds criterion, and to be sure that the laminar flow in technological processes is stable.

At present, homogeneity of substance flow as well as substances in a stationary position could be measured by a large number of well known devices and methods. Their main drawbacks are the electrode contact with the medium, and high measurement inaccuracy, complexity of construction, the complexity of the computation and sensitivity of the elements. Among the variety of existing methods the high-frequency conductometry method stands out for determination of the uniformity of the flow.

Conductometry a set of electro-analytical methods based on measuring the conductivity of the solution. Conductometry methods are divided into methods of contact low frequency AC and contactless high frequency AC methods. In the research the contactless high frequency alternating current conductometry method was used.

This paper presents the results of experimental studies and detailed device for contactless determination of the homogeneity of the medium.

Aims and Objectives
To develop a method and a device to carry out a contactless measurement of substance flow homogeneity with high accuracy.

Methods
Experimental research using lab model of movement of two media.

Results
On the basis of experimental studies a method and a device for contactless measurement of substance flow homogeneity, based on the high-conductivity measurement, were developed. These results indicate that the method is effective when there is a significant difference in the values of the dielectric constant of the media, which was observed for the medium «oil – water».

Key words: contactless method, the uniformity of substance flow, high-frequency conductometry, Reynolds criterion, laminar flow stability

References


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