

## Abstract

In this research the rigorous separation of variables was used to solve the problem of scattering in near-field from a tube containing a mixture.

The mixture to be used is to simulate the actual cases that occur frequently in chemical and petroleum engineering from which, a new method was developed to measure the hold-up using microwave signals. This method can be used for control and monitoring the hold-up.

The theoretical study has taken into consideration the case when the effective permittivity of the mixture is anisotropic. The above study was based on computer calculations using the package MATHCAD. Experimental measurements were carried out also.

The theoretical and practical results have shown good agreement for the reflected and transmitted power.

The results obtained confirmed the possible utilization of this method for control and monitoring the value of hold-up of a mixture.