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ИССЛЕДОВАНИЕ ВЗАИМОДЕЙСТВИЯ ОПТИЧЕСКОГО ИЗЛУЧЕНИЯ И
АКУСТИЧЕСКИХ ВОЛН
С НЕОДНОРОДНЫМИ ЖИДКИМИ СРЕДАМИ
И СОЗДАНИЕ СРЕДСТВ КОНТРОЛЯ ИХ СОСТОЯНИЯ

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It is important to note, that the express control in the production process allows us to obtain the necessary information about the equipment workability, thereby reducing the risk of equipment malfunction.

The purpose of my research is development of the device for the fluids express control in a production environment.

The object of control is technical fluids. They are oils, solutions, suspensions. With the help of the optical control, we determine turbidity of control fluid. Turbidity is the result of the interaction between light and particles suspended in water.

The turbidimetric method of fluids control is realized in the device. Turbidimetry is the method based on measuring the intensity of light of a certain wave length transmitted through the fluid sample. The device implementing this method is called a turbidimetre.

With the help of the acoustic control, we determine the velocity of acoustic waves. As a result it will be possible to identify the fluid by the wave velocity in it. The wave velocity is one of the most important characteristics. If we know the wave velocity, it is possible to determine density, viscosity and other characteristics.

When an ultrasonic wave propagates through a liquid the density, pressure and temperature of an infinitesimal element of liquid vary periodically with time. In ideal (non-viscous, non-absorbing) liquids, the pressure/density cycle due to propagation of an ultrasonic wave takes place adiabatically or at constant entropy. With these assumptions a plane harmonic wave (*i.e.* longitudinal wave) propagates unattenuated and with a frequency independent velocity that is determined by the liquid's compressibility from the thermodynamic equations of state.

Combination of optical and acoustic channels in one device expands the range of applicability of the device.

Designed device can be applied for quality control liquids (engine oil and other oils, solutions, suspensions).