Investigation of damping properties of a two-phase mixture of transformer oil with gas bubbles

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Transformer oils are used in electrical engineering in power and measuring transformers, as well as in oil circuit breakers, in which accidents can occur because of internal short circuit and arc discharge development, which can lead to the destruction of the oil-filled equipment casing. In spite of the fact that in the presence of gas bubbles in a liquid dielectric, a partial discharge can occur in a gas bubble in fields smaller than necessary for oil breakdown [1], interest in recent years to gas-liquid media is associated with their damping properties, which may be sufficient to prevent destruction of the oil-filled equipment casing due to short circuit. The experimental stand was created to study the damping properties of the gas-liquid mixture the classical method of electrical explosion of wire was used. Microbubbles 1 mm and 0.5 mm in diameter are generated with tangential gas supply in the narrowing part of the Venturi tube [2] and Laskin tube. Experimental allowed to obtain synchronized current-voltage characteristics of the discharge, as well as the dependence of the intensity of finite amplitude waves propagating in the mixture of transformer oil with gas bubbles, on the degree of gassing and the bubble size in the mixture. The intensity of waves of finite amplitude decreases strongly in the gas-liquid medium. The work is partly sponsored by Russian Foundation for Basic Research grant No. 17-08-00110