

Discharge channel propagation perpendicular to boundary of water and oil

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The development of the electrohydrodynamic instability and electrical breakdown of the interface between two liquids—electrically conductive water and transformer oil—has been studied experimentally in a pulsed electric field directed along the normal to the interface. It is shown that the closing of the discharge gap occurs slowly at very low average values of the electric field strength (2.6 kV/cm), and is associated with the development of a cone-shaped instability of the liquid interface and the pulling of water into the oil near the upper electrode. The nonlinear dynamics of the development of the interface instability is analyzed. The dependence of the breakdown development time on the amplitude of the applied voltage is established.