FM20S_12239

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Production of Sound Self-Oscillations as a Result of Vapor Condensation

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Generation of spontaneous sound oscillations in an acoustic resonator in the case of condensation of vapor is investigated theoretically and experimentally. The experimental setup is a resonator with warmed cylindrical tank and cooled tube. The quantity of different fluids inserting into the tank is varied. It has been found experimentally that the condensation of vapor on the cold tubeis a necessary requirement of existence of sound oscillations in the system. Furthermore the character of vapor movement is visualized at sound initiation. The mathematical model of this phenomenon is developed. The full system of hydrodynamics equations for compressible fluid with heat transfer and kinetic equations is used. The analytical solution of linearized equations for normal disturbances is found. Neutral curves with regions of oscillating instability are constructed.

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