Experimental investigation of matter velocity distribution in the gases mixing zone induced by the Richtmyer-Meshkov and Rayleigh-Taylor instability

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RFNC-VNIITF used the multifunctional shock tube for experiments aimed to determine matter velocity distribution in the mixing zone of gases having different density based on the method developed for velocity measurements by the laser Doppler anemometer. When the nonstationary shock wave passed through the contact boundary in the heavy-to-light gas direction, it sequentially induced Richtmyer-Meshkov and Rayleigh-Taylor instabilities at this boundary and finally caused the turbulent mixing zone development. Tracking particles having 0.5…1 μm size were added into one of the gases. In the measurement section of the multifunctional shock tube, i.e. at its axis, the measurement volume of the laser Doppler anemometer was organized. When moving, the mixing zone passed through the measurement volume. Tracking particles, when they got inside this volume, created the scattered radiation modulated by the Doppler frequency shift and distribution of matter velocity modulus over the mixing zone was determined.