Measurement of velocity distribution in the gas mixing zone induced by the Earth gravitational field

A.A. Tyaktev, A.V. Pavlenko, D.V. Neuvazhayev,
A.V. Belomestnyckh, V.N. Popov, I.L. Bugaenko

Russian Federal Nuclear Center – Zababakhin Research Institute of Technical Physics (RFNC-VNIITF),
Snezhinsk, Chelyabinsk Region, Russia, Snezhinsk, Chelyabinsk region, Vasilieva st., 13, Russia, dep5@vniitf.ru

RFNC-VNIITF used the testing SOM-facility to investigate matter velocity in the turbulent mixing zone of gases having different density when this mixing is induced by the Rayleigh-Taylor instability in the Earth gravitational field. The optical method based on the laser radiation application, i.e. «laser Doppler anemometer», was used for these investigations. A special diaphragm, i.e. liquid film, separated gases from each other. At some instant, external force destroyed this diaphragm into small-scale fragments and thus the Rayleigh-Taylor instability arose and the turbulent mixing zone was developing at the formed contact boundary. Experiments were performed for two Atwood values and gave the dependencies of the matter velocity vector's vertical and horizontal projection module on time in the turbulent mixing zone for two coordinates of the measurement volume.