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Joint growth of local perturbation and zone of turbulent mixing at gas-jelly interface

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The authors present results of experimental study of joint growth of local perturbation (LP) and zone of turbulent mixing occurred at Rayleigh-Taylor instability at interface of low-strength layer of jelly accelerated by compressed helium.

Local perturbation was a cavity of hemispherical shape with radius varied from $R=0.5$ mm to $R=3$ mm. On the free surface of the layer without local perturbations, background perturbations were specified as small cavities of square section having sizes of $2 \times 2 \times 0.2$ mm.

Pressure of compressed helium was varied from 13 to 300 atm. Acceleration of the layer was changed from $\approx 10^3 g_0$ to $10^5 g_0$ ($g_0=9.8$ m/s²).

It was obtained that:

- a) with increase of LP size, velocity of its growth into jelly layer is growing;
- b) local perturbation with $R=0.5$ mm actually coincides with the zone of turbulent mixing, LP with $R \geq 1$ mm has velocity more than 2 times higher than velocity of the turbulent mixing growth;
- c) at acceleration of layer $g \approx 10^5 g_0$, the internal surface of LP becomes instable.