

M–V–M flame shape dynamics under reversed gravity and acoustic impact

Krikunova A I[®], Saveliev A S, Cheshko A D and Arefyev K Yu

Moscow Institute of Physics and Technology, Institutskiy Pereulok 9, Dolgoprudny, Moscow Region 141701, Russia

[®] krikunovaai@gmail.com

Flame dynamics plays a key role in combustion stability in technical devices. At the same time, acoustic vibrations are an integral part of most of these devices. Therefore the acoustic impact on flame dynamics and stability is an actual issue. It should also be remembered that there is a significant difference in the behavior of flames under varying gravitational conditions, which is an urgent issue under the condition of outer space exploration. Therefore, the study of such combined effects is of great current interest. The current study is devoted to the flame characteristics under the external acoustic field and various gravity conditions. In the course of the work, the parameters for the flame blow-off were determined for the conditions of normal and reverse gravity at different frequencies of acoustic disturbance. The conditions for the V–M and M–V transitions under normal and reverse gravity are compared under perturbation by the acoustics of different frequencies. It is shown that, under certain conditions, acoustics increase the stability of the flame. As in normal gravity, the effect of hysteresis of V–M and M–V transitions is observed. It is shown that under conditions of reverse gravity, in contrast to normal gravity, the degeneracy of the hysteresis does not depend on the frequency of excitation.

This work was supported by the Russian Science Foundation (grant No. 20-79-10328).