

# CHRONO-TOPOGRAPHIC ANALYSIS OF THE FIRE FOCUS DYNAMICS IN THE SHS WAVE<sup>1</sup>

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On the basis of the Ni-Al system, an experimental study of the evolution of individual foci in the SHS wave was carried out. The combustion control was carried out by an original micro thermal imaging system with a spatial and temporal resolution of 5.8  $\mu\text{m}$  and 1 msec respectively (Fig. 1) [1]. To study the dynamics of foci of combustion along the front of the SHS wave (in the X direction), the original technique of chrono-topographic analysis was applied [2]. It allowed: to track in a discrete medium points with identical stages of high-temperature synthesis and to study the dynamics of their spatial distribution; to identify individual foci in the images and determine the statistical distribution of their parameters in the SHS process (Fig. 2).

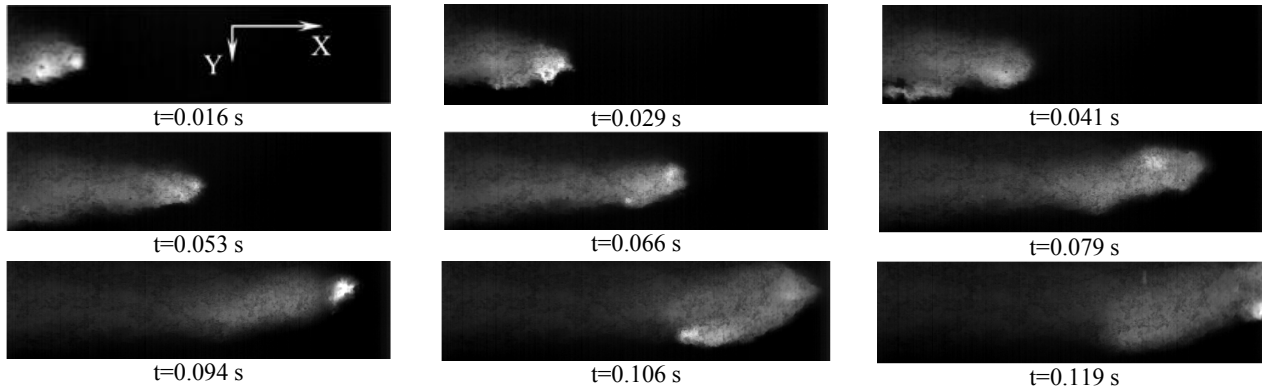


Fig. 1. Frames of micro-thermal imaging: the vector Y is the normal to the front of the SHS wave; the dimension of the viewing area in the X direction is 7.3 mm, in the Y direction 1.87 mm.

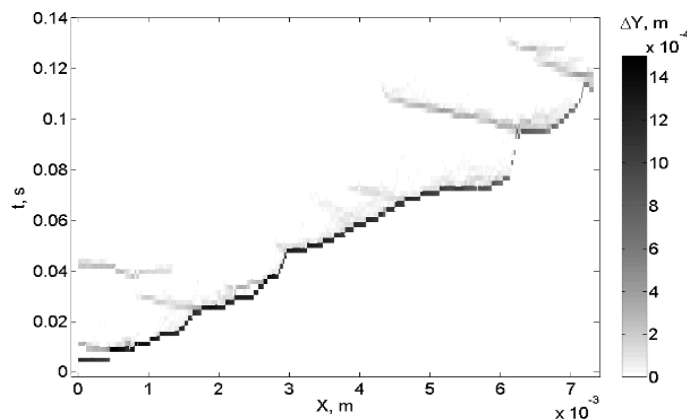


Fig. 2. Chronographic map of the SHS process: shows the shift of the reaction boundary  $\Delta Y$  in the cross section  $X_0$  at time  $t_0$

According to the chronological map of the SHS process, it is found that the development of foci along the wave front is similar to the propagation of the very front of the reaction - there is a stage of rapid displacement of the boundary of the fire focus with a sharp increase in temperature in it (flash stage), and the stage of inhibition, accompanied by a decrease in temperature. Moreover, the transition from the stage of inhibition to a flash causes the creation of a secondary fire focus, which propagates along the front of the SHS wave, but in the opposite direction with respect to the primary fire focus. The spread of secondary foci is unstable and ceases after a while.

## REFERENCES

- [1] Boronenko, M.P., Seregin, A.E., Gulyaev, P.Yu., Milyukova, I.V. // Scientific Visualization. – 2015. – V.7. – pp. 102-108.
- [2] Dolmatov A.V., Berestok G.M. // Bulletin of Ugra State University. – 2017. – V.3(46). – pp. 64-73.

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