

# Initiation of detonation by shock wave in flammable gas containing inert particle

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Particle interaction with shock wave changes the fluid properties in the vicinity of the particle. The bow shock reflects backward from the front side of the particle. Between the bow shock and particle, the subsonic region is arisen. Gas becomes hot and compressed in the subsonic region behind of bow shock front [1]. It is shown in [2] that the danger of initiation of detonation appears when combustible gas shock encounters even the single 100- $\mu\text{m}$  particle. In work [3] detonation limits for shock in hydrogen-oxygen mixture with solid particle suspended in fluid were obtained numerically. In all our previous work the particles were assumed to be adiabatic.

Main idea of our work is to improve understanding of details of regimes, which potentially enable to initiate the detonation. We have investigated the heat disturbance caused by the particle and in the present work, we have focused on study of heat conduction and heat accumulation in the particle and how the heat absorption effects on the fluid properties. Data on energy balance between the particle and gas fluid are necessary for clarification of detonation limits with taking into account of described process.

The spatial and time limits of used methods are determined.

- [1] Obruchkova L, Baldina E and Efremov V 2017 *Thermal Engineering* **64** 224–233
- [2] Efremov V, Obruchkova L, Kiverin A and Ivanov M 2018 *J. Phys.:Conf. Ser.* **946** 012073
- [3] Efremov V, Obruchkova L and Kiverin A 2019 *Herald of the Bauman Moscow State Technical University, Series Natural Sciences* **6** 67–82