States of matter behind the shock front in the mixture of light and heavy gases

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In fluid dynamics simulations it is usually suggested that the shock front width is negligible, and the thermodynamic equilibrium is reached instantly. It was shown that the front width is finite due to mass, thermal, and momentum diffusion (viscosity) and proportional to the mean free path of a molecule [1]. Nowadays it is possible to check the limits of theoretical predictions using molecular dynamics modelling.

In this study we analyze the state behind the shock in a binary mixture of light and heavy gases, which has also been considered in Ref. [1]. Using the Moving Window technique [2] it is possible to obtain a stationary state with the shock front within a computational domain and collect statistics. The analysis of average temperature and velocity distributions allows us to check whether some deviations from theory may be observed.

[1] Zel'dovich Y B and Raizer Y P 2002 *Physics of Shock Waves and High-Temperature Hydrodynamic Phenomena* (Dover Publications)
[2] Murzov S A, Parshikov A N, Dyachkov S A, Egorova M S, Medin S A and Zhakhovsky V V 2021 *H. Temp.* **59** 195–204