

# Moving window technology for simulation of shock wave propagation

Murzov S.A.<sup>1,2,®</sup>, Dyachkov S.A.<sup>1,2</sup>, Vyskvarko G.V.<sup>1,3</sup> and Levashov P.R.<sup>1,3</sup>

<sup>1</sup> Moscow Institute of Physics and Technology, Institutskiy Pereulok 9, Dolgoprudny, 141701, Russia

<sup>2</sup> Dukhov Research Institute of Automatics (VNIIA), Luganskaya 9, Moscow, 115304, Russia

<sup>3</sup> Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow, 125412, Russia

® pasha@jihl.ru

This paper describes an approach to modeling stationary shock waves (SW) in materials using the developed method of moving observation window used in conjunction with Lagrangian numerical methods. This approach allows to iteratively adjust the reference frame to the boundary conditions, which provides control of the entrance to and exit from a fixed computational domain of particles modeling the flow of a compressible medium.

The method was first applied with the molecular dynamics [1] method, and the method developed in this work can also be applied with the smoothed particle hydrodynamics method and with mesh Lagrangian methods of similar purpose. This extends its applicability for modeling a wide range of physical processes, including the dynamics of liquids and gases under various conditions.

The paper shows the advantage of the new method over the previously developed method [2] in terms of the speed of establishment of stationary flow in the observation window.

This work was supported by Russian Science Foundation, grant No. 24- 19-00746.

[1] Zhakhovsky V V, Budzevich M M, Inogamov N A, Oleynik I I and White C T 2011 *Physical review letters* **107** 135502

[2] Murzov S A, Parshikov A N, D'yachkov S A, Egorova M S, Medin S A and Zhakhovskii V V 2021 *High Temperature* **59** 230–239