SPH simulated boron carbide failure under shock compression

Dyachkov S A¹,²,³, @, Parshikov A N¹ and Zhakhovsky V V¹

¹ Dukhov Research Institute of Automatics (VNIIA), Sushchevskaya 22, Moscow 127055, Russia
² Joint Institute for High Temperatures of the Russian Academy of Sciences, Izhorskaya 13 Bldg 2, Moscow 125412, Russia
³ Moscow Institute of Physics and Technology, Institutskiy Pereulok 9, Dolgoprudny, Moscow Region 141700, Russia

@ serj.dyachkov@gmail.com

Boron carbide response to shock compression, large strains, and high strain rate is of the present-day interest. Due to unique strength properties of material it has numerous applications. Nevertheless, under shock loading boron carbide is involved into a process of failure [1] what significantly reduces its strength as demonstrated in plate-impact experiments [2].

Boron carbide failure process under shock compression is investigated by comparison of SPH [3] simulations with two sets of plate-impact experiments where samples manufactured using different technology [2, 4]. Different boron carbide failure models are applied to determine relevant physical properties which influence wave profiles obtained by VISAR measurements. The strength at the failed state of material is demonstrated to be different in considered experiments independently of particular model.