The influence of the shock wave on the hydrodynamic fields for the high-current discharge in high density gas: numerical evaluation

Triaskin J V[2,1,@] and Pinchuk M E[1]

[1] Institute for Electrophysics and Electrical Power of the Russian Academy of Sciences, Dvortsovaya Naberezhnaya 18, Saint-Petersburg 191186, Russia
[2] Saint-Petersburg State University, Universitetskaya Naberezhnaya 7/9, Saint-Petersburg 199034, Russia

[@] ubik33@yandex.ru

Hereby we present description of the hydrodynamic model of compressive shock wave propagation and adiabatic unloading along the radius of a cylindrical discharge chamber filled with hydrogen at a high pressure of (0.1–32 MPa) at a current rise rate of $dI/dt \approx 10^{10}$ A/s [1]. It is shown that a family of modified two-step numerical methods of the second order of accuracy based on classical finite-difference schemes [2] with additional steps for smoothing the solution [3] gives a close-to-true of the hydrodynamic fields in the problem [1,3]. The comparison was carried out in terms of the compression force on the axis of the channel by the shockwave, as well as the temperatures and the pressures reached.

[1] Rutberg Ph G, Bogomaz A A, Pinchuk M E, Budin A V, Leks A G and Pozubenkov A A 2011 *Phys. Plasmas* **18** 122702
[2] Richtmyer R D 1967 *Differece methods for initial-value problems*
[3] P B J *Flux corrected transport*