

Modeling for compression of magnetized plasma for cylindrical and spherical implosions

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Specific research interests in astrophysics and plasma physics include numerical study of the interaction of the pulse jets, arising from a group of adjacent discharges. The process of rapid compression of gas in the seed magnetic field, and then plasma in a strong magnetic field by laser beams and plasma guns is considered. Modeling and numerical analysis of a magneto-inertial fusion [1-9] concept with the target compressed by laser beams and high velocity plasma jets is presented.

Special attention is given to numerical investigation on target implosions driven by high speed plasma jets, which may arise from different discharges. The paper presents two-dimensional spatial distribution of density, temperature, pressure, magnetic pressure and velocity, corresponding to the interaction of pulsed plasma gas jets issuing from the capillary discharge system. The physical and mathematical model of the symmetrical target implosion is developed and the test results are discussed.

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References

- [1]. C. Li, X. Yang, "Modeling and numerical analysis of a magneto-inertial fusion concept with the target created through FRC merging," *Physics of Plasmas* **23**, 102702 (2016)
- [2]. I.Yu. Kostyukov, S.V. Ryzhkov, "Magneto-inertial fusion with laser compression of a magnetized spherical target," *Plasma Physics Reports* **37**, №13, 1092-1098 (2011)
- [3]. V.V. Kuzenov and S.V. Ryzhkov, *Bull. Russ. Acad. Sci.: Phys.* **80**, 598 (2016)
- [4]. S.V. Ryzhkov, "The behavior of a magnetized plasma under the action of laser with high pulse energy," *Problems of atomic science and technology* №4 (7), 105-110 (2010)
- [5]. S.V. Ryzhkov, A.Yu. Chirkov and A.A. Ivanov, *Fusion Science and Technology* **63** (1T), 135 (2013)
- [6]. V.V. Kuzenov and S.V. Ryzhkov, *Problems of Atomic Science and Technology* **1**, 12 (2013)
- [7]. V.V. Kuzenov and S.V. Ryzhkov, *Problems of Atomic Science and Technology* **4** (86), 103 (2013)
- [8]. S.V. Ryzhkov, *Proc. of 35th EPS Conf. on Plasma Physics and Contr. Fusion*, ECA Vol. 32D, P1.114 (2008)
- [9]. I.R. Lindemuth, "The ignition design space of magnetized target fusion," *Physics of Plasmas* **22**, 122712 (2015)