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MAGNETO-INERTIAL FUSION AND POWERFUL INSTALLATIONS

S.V. RYZHKOV

Bauman Moscow State Technical University (BMSTU)
2-nd Baumanskaya Street, 5,1 Moscow, 105005 Russian Federation
E-mail svryzhkov@bmstu.ru

Abstract. A review of theoretical and experimental studies in the field of compression and heating of a plasma target in an external magnetic field, which has recently been called magneto-inertial thermonuclear fusion (MIF), has been carried out. An analysis of the current state of work on the implosion of magnetized targets and the effect of an external magnetic field on the main plasma parameters and system characteristics is presented. Questions of numerical simulation of experiments on magnetic-inertial confinement of plasma are touched upon. Particular attention is paid to two promising areas of MIF - with plasma guns (plasma jets) and with a laser driver (laser beams) (Kuzenov V.V., Ryzhkov S.V. 2019, 2021, 2023, Ryzhkov S.V. 2023, Ryzhkov S.V., Chirkov A.Yu. 2018).A mathematical model has been developed for the study of nonstationary processes of heating and compression of a substance in an external magnetic field by several laser and plasma beams. The authors have created a group of models that take into account the key effects of internal thermonuclear energy release, kinetics of synthesis products and dynamics of magnetized plasma. A new model of interaction in the system "magnetized preformed plasma-high–speed plasma jets" and "magnetized target-high–power laser" is proposed. A comprehensive analysis of the retention of the plasma configuration in the seed magnetic field after uniform compression and numerical analysis based on a nonstationary two-dimensional radiation-magneto gas dynamic (RMGD) model, taking into account electronic thermal conductivity and radiation-convective, was carried out.

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