

عنوان مقاله:

New Fast Ignition of DT Fusion Reactions Considering TBR

محل انتشار:

دومین کنفرانس بین المللی پژوهش در مهندسی، علوم و تکنولوژی (سال: 1394)

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خلاصه مقاله:

Deuteron beam created by laser acceleration in fast ignition D-T fuels is proposed as an ignition mechanism. The fuel is assumed to have density $3 \times 10^{22} \text{ cm}^{-3}$ and a Maxwellian velocity distribution at a uniform temperature. The stopping powers of the fuel species for deuterons with high initial energy are evaluated and used to evaluate the energy deposited in the fuel. The energy deposition in the fuel reactants and the deposited energy is augmented due to the additional fusion reactions initiated by the beam particles. Results show that the extra energy from beam-target fusion reactions is important. The extra energy is more significant at lower beam energy and higher electron temperature. Also conditions necessary to achieve D-T fuel self-sufficiency in fusion reactors are derived through extensive modeling and calculations of the required and achievable tritium breeding ratios as functions of the many reactor parameters and candidate design concepts. It is found that the excess margin in the breeding potential is not sufficient to cover all present uncertainties. Thus the goal of attaining fuel self-sufficiency significantly restricts the allowable parameter space and design concepts.

کلمات کلیدی:

Deuteron , Fast ignition, Bonus energy , Tritium breeding

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