

Evaluation of minimum neutron source strength required for ignition of D-T fuel

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Abstract

Minimum thermal and cold neutron source strength necessary for the thermonuclear ignition of D-T fuel using the energy released in exothermic ${}^3\text{He}(n, p)\text{T}$ reaction is determined for representative tokamak parameters, when the tokamak inner walls are lined with good thermal neutron reflectors. It is found, that D-T ignition is possible with the help of currently available neutron sources if the particle and energy confinement times exceed tens of seconds. If thermal or cold neutron sources having strength greater than 10^{23} s^{-1} can be constructed, then D-T ignition is possible even in plasmas having energy and particle confinement times in the range of one tenth of a second. Although the focus here is on tokamak fusion reactors the results are applicable to other type of reactors as well.