

Characteristics of Transmutation Reactor Based on LAR Tokamak

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A compact tokamak reactor concept as a 14 MeV neutron source is desirable from an economic viewpoint for a fusion-driven transmutation reactor. LAR (Low Aspect Ratio) tokamak allows a potential of high Q operation with high bootstrap current fractions and can be used for a compact fusion neutron source. For the optimal design of a reactor, a radial build of reactor components has to be determined by considering the plasma physics and engineering constraints which inter-relate various reactor components and are constrained to use ITER physics and technology. In a transmutation reactor, the blanket should produce enough tritium for tritium self-sufficiency and the neutron multiplication factor, k_{eff} should be less than 0.95 to maintain sub-criticality. The shield should provide sufficient protection for the superconducting toroidal field (TF) coil against radiation damage and heating effects of the fusion neutrons, fission neutrons, and secondary gammas. In this work, characteristics of transmutation reactor based on LAR tokamak is investigated by using the coupled system analysis.

Keywords: Transmutation, LAR Tokamak