

Optimum Radial Build of a Low Aspect Ratio Tokamak Reactor

B.G. Hong¹, Y.S. Hwang² and J.S. Kang²

¹Chonbuk National University, ²Seoul National University

In a low aspect ratio (LAR) tokamak reactor with a superconducting toroidal field (TF) coil, the radial build of TF coil and the shield play a key role in determining the size of a reactor. For self-consistent determination of the reactor components and physics parameters, a system analysis code is coupled with one-dimensional radiation transport code. Conceptual design study of a compact superconducting LAR tokamak reactor with aspect ratio less than 2.5 was conducted and the optimum radial build was identified. It is shown that the use of an improved shielding material and high temperature superconducting magnets with high critical current density opens up the possibility of a fusion power plant with compact size and small re-circulating power simultaneously at low aspect ratio, and that by using an inboard neutron reflector instead of breeding blanket, tritium self-sufficiency is possible with outboard blanket only and thus compact sized reactor is viable.

Keywords: LAR tokamak, reactor design, system analysis