

Design Status of Korea ITER Helium Cooled Solid Breeder Test Blanket Module

안무영^{1*}, 김덕희¹, 조승연¹, 윤성환², 조남진²

¹핵융합연구센터, ²KAIST

* E-mail : myahn74@nfrcl.re.kr

TBM(Test Blanket Module) as a first blanket testing in fusion environment operated in ITER(International Thermonuclear Experimental Reactor) will play a very important role to demonstrate DEMO relevant technologies such as tritium self-sufficiency, extraction of high-grade heat. Under ITER test conditions, validations of essential informations, namely, theoretical predictions on TBM structural integrity under combined mechanical and electromagnetic loads, tritium breeding prediction, tritium recovery process efficiency and inventory in blanket materials, thermal predictions with volumetric heat sources, and integral performance of the blanket systems, can be obtained.

Korea has considered two types of DEMO blankets, one is HCSB(Helium Cooled Solid Breeder) and the other is HCML(Helium Cooled Molten Lithium). In the present research, current design status of HCSB is investigated. The lithium ortho-silicate as breeder material, berillium as neutron multiplier, low activation ferrite/martensite steel as structural material, helium as coolant and tritium purge gas are adopted in the design. The key feature of the design is that graphite neutron reflector is used to reduce amount of beryllium. Neutronics, thermo-hydraulic and mechanical analyses have been performed to optimize TBM composition. Finally the critical issues and the related R&D of the HCSB blanket design for the application in a DEMO reactor is mentioned.

참고문헌

1. 조승연, "Current Status of KO TBM Work(HCSB)", TBWG-17, Cadarache, France, April 4-6, 2006.