

Tritium breeding response of He-cooled octalithium plumbate breeding blanket

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Large Be mass requirements is a major prospective drawback for future deployment of fusion power reactor based on solid breeder blanket ceramic concept.

⁶Li-enriched octalithium plumbate (${}^6\text{Li}_8\text{PbO}_6$) has characteristics of ideal neutron multiplier/tritium breeding ceramic. In breeding blanket consideration of octalithium plumbate as a breeding ceramic would potentially minimize the amount of Be required for neutron multiplication or even avoid its need.

A neutronic assessment for tritium response (TBR) has been generated for an onion-cell 3D toroidally-symmetric blanket model considering helium as primary coolant and octalithium plumbate as breeding material and a ferritic-martensitic steel structure under a real fusion reactor volumetrically distributed neutron source.

The characteristics of such neutronic model are presented.

For given TBR values of interest an assessment on the volumetric ratio of additional multiplier (Be) is provided depending on octalithium ceramic characteristics (porosity and ⁶Li enrichment).

Tritium responses show promising results to potentially support a possible breeding blanket design concept.