NEUTRONIC ANALYSIS AND OPTIMIZATION OF A DUAL HE/LIPB COOLANT BREEDING BLANKET FOR DEMO

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A conceptual design of a DEMO fusion reactor based on a dual coolant blanket is being developed under the *Spanish Breeding Blanket Technology Programme*: TECNO_FUS. This design contains a dually-cooled breeding zone with $Pb-15.7(2)Li^6$ serving as breeder and coolant and pressurized helium as supplementary primary coolant. Structural materials are ferritic-martensitic steels (Eurofer-like and Eurofer-ODS type). Design uses SiC as liquid metal flow channel inserts.

The analyses are detailed together with a complete list of functional hierarchic design responses for optimum Li^6 enrichment of the eutectic:

(1) required shielding factors of BB/VV structures for superconducting magnets shielding,
(2) energy deposition within the structures distributions ensuring overall power amplification,
(3) tritium breeding ration performances for of the component,
(4) structural and functional material response in terms of damage, ionizing doses and gas production: dpa, dpa rates, H/dpa and He/dpa, and ionizing doses in SiC (flow channels inserts) in order to estimate the operational life-time and to progress in the analysis of breeding blanket functionality,
(5) material activation for waste management assessment in breeding blanket component and surrounding media.

MCNPX has been used for transport calculations and ACAB for material activation. Refined analyses including general plasma volumetric source parametric distributions linked to fully automatic methods to generate inputs geometries into MCNPX code are performed.