Critical issues & challenges in the engineering of DEMO divertor target

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Abstract

Development of a diverter target with a sufficient capability of power exhaust is a crucial prerequisite for the realization of a fusion power plant. While the design and technology for divertor target has been successfully developed for ITER, the applicability of this concept is not necessarily assured yet for DEMO mainly because the neutron irradiation dose expected for DEMO divertor will be by an order of magnitude higher than that of the ITER divertor. The possible embrittlement of structural heat sink materials due to irradiation is likely to restrict the structural performance and the operational flexibility of a target component to a considerable extent. For judgment of design feasibility of a novel target concept a quantitative evaluation of the thermal and structure mechanical performance is needed.

In this contribution, a brief overview is presented on the critical issues of the materials/design interface for the engineering of DEMO divertor target. Emphasis is put on the mutual impact between the design requirements and the performance of structural and armor materials. In addition, a concise review on the two conventional target design concepts is given. Finally, an outlook of novel design concepts and the related technology trend are introduced.