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The reliability design of CFETR divertor

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The design of divertor is one of the most challenges for CFETR as the max heat flux on the CFETR divertor would be more than 20MW/m² and the max plasma current is 1MA. Surface and structural damage to divertor due to the frequent loss of plasma confinement remains a serious problem for the tokamak reactor concept. The deposited plasma energy during major disruptions, edge-localized modes (ELMs), and vertical displacement events (VDEs) causes significant surface erosion, possible structural failure, and frequent plasma contamination. The duty cycle of CFETR should be at least 0.3-0.5. This suggests a very high reliability for divertor and other key subsystems. At the pre-conceptual phase the structure of divertor has to be improved by system and reliability analysis. The plasma facing components, supports and their joints have been optimized by results of reliability design. The reliability design uses probabilistic methods to describe the loads and operation conditions and estimates the frequencies of plasma events.

Eligible for student paper award?

No

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