

Exploring ELM-free operation for CFETR

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Abstract

With the proposed development of the next China Fusion Engineering Test Reactor CFETR, identifying stable operation regimes with good performance is a key goal of CFETR engineering design. To achieve this goal Type I ELMs with large amplitudes have to be avoided in order to prevent excessive erosion of the divertor target material.

This study investigates various methods to achieve ELM-free or ELM suppressed operations in CFETR. Using a combination of EPED and ELITE, we map out the operating space of the CFETR pedestal, and explore the ELM characteristics along the marginal stability boundary. The pedestal current and density for optimized performance is identified. The ELM behavior is classified using nonlinear BOUT++ simulation. Ways to suppress or avoid ELMs will be discussed.