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Evaluating the effects of tungsten on CFETR phase I performance[1] SHENGYU SHI, Univ of Sci Tech of China, XIANG JIAN, UCSD, VINCENT S. CHAN, Univ of Sci Tech of China, CFETR PHYSICS TEAM — An integrated modeling workflow using OMFIT is constructed to evaluate the effects of tungsten (W) impurity on China Fusion Engineering Test Reactor (CFETR) performance. Self-consistent modeling of W core density profile, accounting for both turbulent and neoclassical transport contributions, is performed based on the steady-state scenario of CFETR phase I (Wan *et al* 2016 IAEA and 2017 *Nucl.Fusion* 57 102009). It is found that the fusion performance degrades mildly with increasing W concentration. The main challenge arises in the sustainment of H-mode operation with significant W radiation. Assuming that the power threshold of H-L back transition is approximately the same as that of L-H transition, it is found that the W fraction at the plasma boundary is not allowed to exceed 2e-5 to stay in H-mode for CFETR phase I according to the scaling law proposed by Takizuka (Takizuka etc, Plasma Phys. Control Fusion, 2004). In addition, it is found that the tolerance of W concentration decreases with increasing pedestal density through a trade-off study of pedestal density and temperature. A future step is to connect the core simulation to W wall erosion modeling.

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