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Investigation of impurity radition in Wendelstein 7-X startup plasmas with EMC3-Eirene FLORIAN EFFENBERG, Department of Engineering Physics, University of Wisconsin - Madison, YUEHE FENG, SERGEY BOZHENKOV, IPP Greifswald, Germany, HEINKE FRERICHS, UW Madison, HAUKE HOELBE, THOMAS S. PEDERSEN, IPP Greifswald, Germany, DETLEV REITER, Forschungszentrum Juelich GmbH, Germany, OLIVER SCHMITZ, UW Madison — The optimized stellarator Wendelstein 7-X will be operated in a limiter configuration during the first plasma operation phase. In this field configuration the plasma boundary does not include magnetic islands and the scrape-off layer is defined by five poloidal graphite limiters located at the bean shaped symmetry planes. The limiters define the position of the last closed flux surface and are positioned such that they prevent for high heat fluxes onto the unprotected main chamber wall and metallic frame structure of the later divertor targets. Considering startup plasmas with heating power up to 4MW and densities up to $9\times10^{19}\mathrm{m}^{-3}$ heat loads to plasma facing components (PFCs) and the generation of impurities due to plasma surface interaction become a concern. Plasma transport simulations are performed with the 3D fluid plasma edge and kinetic neutral transport code EMC3-Eirene. It is based on a fluid model for electrons and ions, a kinetic model for neutral particles, and a fluid approach for impurity ions. Results are discussed for a systematic scan of plasma scenarios assessing the production and transport of impurities. In particular radiation cooling is explored as means to reduce impurity production and heat loads to PFCs.

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