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Investigations on Sawtooth Reconnection in ASDEX Upgrade Tokamak Discharges Using the 3D Non-linear Two-fluid MHD Code M3D-C1 ISABEL KREBS, Max-Planck/Princeton Center for Plasma Physics, STEPHEN C. JARDIN, Princeton Plasma Physics Laboratory, Princeton, NJ, USA, VALENTIN IGOCHINE, SIBYLLE GUENTER, MATTHIAS HOELZL, Max Planck Insitute for Plasma Physics, Garching, Germany, ASDEX UPGRADE TEAM — We study sawtooth reconnection in ASDEX Upgrade tokamak [Herrmann et al., Fusion Sci. Technol. 44(3) (2003)] plasmas by means of 3D non-linear two-fluid MHD simulations in toroidal geometry using the high-order finite element code M3D-C1 [S.C. Jardin et al., J. Phys.: Conf. Ser. 125 (2008)]. Parameters and equilibrium of the simulations are based on typical sawtoothing ASDEX Upgrade discharges. The simulation results are compared to features of the experimental observations such as the sawtooth crash time and frequency, the evolution of the safety factor profile and the 3D evolution of the temperature. 2D ECE imaging measurements during sawtooth crashes in ASDEX Upgrade indicate that the heat is transported out of the core through a narrow poloidally localized region [Igochine et al., Phys. Plasmas 17 (2010)]. We investigate if incomplete sawtooth reconnection can be seen in the simulations which is suggested by soft X-ray tomography measurements in ASDEX Upgrade showing that an (m=1,n=1) perturbation is typically observed to survive the sawtooth crash and approximately maintain its radial position [Igochine et al., Phys. Plasmas 17 (2010)].

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