

Abstract Submitted  
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**Sawtooth period control by power modulation** MENNO LAURET, EUGENIO SCHUSTER, Lehigh University, MARCO DE BAAR, FOM DIFFER, FEDERICO FELICI, MAURICE HEEMELS, ALEXANDER GOMES, Eindhoven University of Technology, TIM GOODMAN, DOOHYUN KIM, OLIVIER SAUTER, CRRP, GERD VANDERSTEEN, Vrije Universiteit Brussel, GERT WITVOET, TNO, MORTEN LENNHOLM, JET, European Commission — It is foreseen that long sawtooth oscillations will occur during ITER H-mode scenarios leading to confinement loss and even disruptions. Sawtooth period control is therefore crucial. Most sawtooth period control approaches depend on changing the deposition location of electron-cyclotron current drive (ECCD) near  $r(q=1)$ . In contrast to this, several TCV and AUG experiments with fixed ECCD deposition location show that ECCD power modulation, either periodic or feedback controlled, can lead to fast and reliable period control. To understand this nonlinear phenomenon, a reduced and ‘hybrid’ reset model has been derived that models the nonlinear dynamics. Analysis reveals that the sawtooth period can be controlled by power modulation, even in the case of significant model uncertainties or when there is a significant lengthening effect of the fast particles on the sawtooth period, as there will be in ITER. The model can also be used to design period control using ICRH influencing this fast particle effect.

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