

## **Exploring sawtooth-like crashes triggered by current drive in Wendelstein 7-X**

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In this work, we present a study on the modeling of magnetohydrodynamic (MHD) events associated with electron cyclotron current drive (ECCD) in the Wendelstein 7-X (W7-X) stellarator where the external current drive modifies the rotational transform in such a way that it passes through low-order rational values twice. The nonlinear evolution of the double-tearing mode usually exhibits more complex dynamical behavior than its single-tearing counterpart. This may lead to a disruption when the two islands interact with each other. These scenarios are of particular interest due to the potential for high heat and electromagnetic loads, which fall outside the stellarator's safe operation window. The modeling is conducted using the MHD code JOREK, which has been recently adapted for three-dimensional geometries [1].

We investigate the conditions under which ECCD-induced crashes occur in W7-X, with a particular focus on the roles of rotational transform and plasma resistivity profiles. We also examine the nonlinear MHD evolution of these crashes, identifying key parameters and behaviors that contribute to the onset and severity of disruptions.

[1] N. Nikulsin et al., Physics of Plasmas 29, 063901 (2022)