

Abstract Submitted  
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**Extremum-Seeking Stabilization of Neoclassical Tearing Modes in Tokamak Plasmas**<sup>1</sup> WILLIAM WEHNER, EUGENIO SCHUSTER, Lehigh University — Current injection by Electron Cyclotron Current Drive (ECCD) has been proved experimentally as an effective method to stabilize neoclassical tearing modes (NTM). The effectiveness of this method is limited in practice by the uncertainties in the width of the island, the alignment between the island and the EC beam, and the EC power threshold for NTM stabilization. Heuristic search and suppress algorithms have been proposed and shown effective to improve the alignment of the EC beam with the island by just using an estimate of the island width. Making use of this estimate, a real-time, non-model-based, extremum-seeking, optimization algorithm is proposed in this work for EC beam steering and modulation in order to minimize the time (control energy) required for NTM stabilization. A model is proposed for the dynamic response of the island width to different parameters of the EC beam such as alignment, width, power, modulation duty-cycle and modulation phase. The efficiency of the proposed method is compared with traditional search and suppress algorithms.

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