

Abstract Submitted
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Control of Sawtooth Oscillation Dynamics using Externally Applied Stellarator Transform¹ J.L. HERFINDAL, D.A. MAURER, G.J. HARTWELL, D.A. ENNIS, Auburn University — Sawtooth instabilities have been observed in the Compact Toroidal Hybrid (CTH), a current-carrying stellarator/tokamak hybrid device. Experiments varying the vacuum rotational transform from 0.02 to 0.13 were conducted to explore the effect of 3D magnetic shaping on sawtooth dynamics by changing the amount of confining field from the external coils. The sawtooth period and amplitude are observed to decrease with increasing levels of 3D magnetic field from the external coils. The crash time of the sawtooth oscillation is not correlated with the amount of vacuum transform applied, indicating that the final nonlinear reconnection dynamics of the MHD kink-tearing instability are not affected. The observed decrease in both sawtooth period and amplitude is correlated with an estimation of the mean elongation of the last closed flux surface, rather than to core equilibrium changes such as a change in the central ohmic heating rate. Given that the kink-tearing mode is well known to be destabilized by elongation in tokamak plasmas, this observation supports an interpretation of the reduced sawtooth period being due to a change in the linear stability threshold for the kink-tearing mode responsible for the crash.

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