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Formation and stability of impurity "snakes" in tokamak plasmas
LUIS F. DELGADO-APARICIO, PPPL, L. SUGIYAMA, MIT-LNS, R. GRANETZ, J. RICE, Y. PODPALY, M.L. REINKE, MIT-PSFC, D.A. GATES, E. FREDRICKSON, PPPL, C. GAO, M. GREENWALD, MIT-PSFC, K. HILL, PPPL, A. HUBBARD, E. MARMAR, MIT-PSFC, N. PABLANT, S. SCOTT, R. WILSON, R. WILSON, PPPL, S. WOLFE, S. WUKITCH, MIT-PSFC — Although (1,1) "snake" modes were discovered at JET more than 25 years ago, there are still basic unanswered questions regarding their formation, stability, and superb particle confinement, shown by surviving tens to hundreds of sawtooth cycles. High-resolution spectroscopic imaging diagnostics have facilitated the determination of the perturbed radiated power density and temperature oscillations inside the mode with unprecedented temporal and spatial resolution, making it possible to infer, for the first time, the perturbed profiles of the impurity density, plasma pressure, Zeff, and resistivity at the center of these helical modes. These new results indicate that snakes form as an asymmetry in the impurity ion density that undergoes a seamless transition from a small helically displaced kink density to a large crescent-shaped helical island structure inside $q < 1$, with a regularly sawtoothing core. These new high-resolution observations show details of their evolutio

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