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Fast Ion Redistribution due to Fishbones in MAST[1] RICHARD LAKE[2], Centre for Fusion, Space & Astrophysics, Department of Physics, University of Warwick, Coventry, CV4 7AL, UK, SIMON PINCHES, ROB AKERS, EURATOM/CCFE Fusion Association, Culham Science Centre, Abingdon, OX14 3DB, UK, ERWIN VERWICHTE, Centre for Fusion, Space & Astrophysics, Department of Physics, University of Warwick, Coventry, CV4 7AL, UK — The confinement of fusion born α-particles for sufficient duration that they heat the bulk fuel ions and maintain thermonuclear burn is an important challenge in magnetically confined fusion. Fast ion driven plasma instabilities such as fishbones can lead to a significant fast ion redistribution and loss, degrading performance. Neutral beam injection in MAST drives fishbones that coincide with drops in the neutron rate. We present a detailed numerical study of the evolution of a single fishbone. Resonant regions of phase space are identified, which move as the frequency of the mode sweeps downward. The fishbone mode redistributes the fast ions, which is quantified by means of transport coefficients. The anomalous fast ion transport these coefficients represent is similar to that required by other codes modelling the same phenomena. Numerical representations of experimental diagnostics also allow a quantitative comparison with experimental observations.

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