Effects of ICRH on the Dynamics of Fast Particle Excited Alfvén Eigenmodes

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ICRH is often used in experiments to simulate destabilization of Alfvén eigenmodes by thermonuclear α-particles. Whereas the slowing down distribution of α-particles is nearly isotropic, the ICRH creates an anisotropic distribution function with non-standard orbits. The ICRH does not only build up gradients in phase space, which destabilizes the AEs, but it also provides a strong phase decorrelation mechanism between ions and AEs. Changes of the orbit invariants by collisions and interactions with other waves lead to stochastic changes in the phase between the particles and the AEs, resulting in a diffusive redistribution of the ions. Depending on the phase space gradients of the distribution function some parts of phase space will drive the modes while other will damp the mode. As the AEs grow up the distribution function is flattened in the resonant regions, which leads to a reduced drive, and the stable parts of the distribution function will damp out the mode. As the unstable gradients are restored the modes will grow up again, resulting in a burst-like behavior of the mode amplitude. Renewal of the distribution function by thermonuclear reactions and losses of α-particles to the wall lead to a continuous drive of the AEs. Simulations of the non-linear dynamics of AEs and the impact they have on the heating profile due to particle redistribution will be presented.