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Enhanced radial energy transport induced by radially Curved Alfvén Eigenmode wavefronts[1] GERRIT J. KRAMER, PPPL, BEN J. TOBIAS, LLNL, ALAN TURNBULL, GA, ERIC M. BASS, UCSD — A surprising observation from the Electron Cyclotron Emission Imaging (ECE-I) diagnostic is that the Alfven eigenmode (AE) wave fronts are radially curved. We show that for non-linearly saturated AEs this wavefront curvature is consistent with a spatial mismatch between the drive and damping: the mode has to transport the power gained at the location of the drive to the damping region where the power is dissipated. This radial energy transport is set up by the wavefront curvature as is deduced from the Poynting flux induced by the mode. The Poynting flux is calculated from ideal MHD whereby the radial displacement of the mode is modified by an additional phase factor that is consistent with experiments. Without a radial phase factor, the mode-induced power flow is mainly along the field lines but including the radial phase factor strong radial power flows are generated. The source and sink regions as determined from Poynting's theorem coincide with the fast-ion mode drive and damping regions as calculated with the NOVA-k code. Therefore, the drive and damping regions for AEs can be deduced from the observed radial wavefront curvature.

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