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Electron kinetic effects on the nonlinear evolution of Reverse Shear Alfven Eigenmodes YANG CHEN, University of Colorado at Boulder, GUO-YONG FU, Zhejiang University, China, SCOTT PARKER, University of Colorado at Boulder — For near marginal EP driven Alfven modes the main nonlinear saturation mechanism is the trapping of resonant particles in the wave field. As the drive increases, other nonlinear effects become important. We use gyrokinetic ion/drift-kinetic electron GEM PIC simulation to examine nonlinear effects due to zonal structures and excitation of higher harmonics of the driving mode (here an n=4 RSAE). We find that, with the n=0 and n=8 perturbations included, the n=4 saturation amplitude follows the trapping scaling at low growth rates. As the growth rate increases (by increasing the beam density), the initial n=4 saturation level is modified. Both the n=0 and the n=8 perturbations are force generated by the n=4 mode via the thermal species nonlinear effects. Unlike ITG, spontaneous excitation of the zonal flows is not seen. The effect of n=0 comes from the zonal electron and ion densities, which cause fine scales in the n=4 mode structure. The Er shearing effect appears to be small. Another nonlinear damping mechanism comes from kinetic electrons. The force generated n=8 electron current gives rise to a perpendicular n=4 current due to field line bending, and this perpendicular current leads to a significant Joule heating on the electrons and damping of the driving n=4 RSAE.

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