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Nonlinear Landau damping and edge electron heating of electron Bernstein waves[1] JOHN R. CARY, University of Colorado and Tech-X Corporation, NONG XIANG, University of Colorado — In 1D simulations, it has been shown that nonlinear wave- particle interactions such as parametric decays and nonlinear Landau damping play an important role in electron Bernstein wave (EBW) propagations and absorptions. In this work, 3D particle-in-cell simulations are conducted with taking the wave antenna structure into account. The wave coupling and propagation around the mode-conversion layer are extensively studied. It is found that for typically experimental EBW heating parameters, if the incident frequency is larger than the second harmonic electron cyclotron frequency near the upper hybrid resonance (UHR), the incident wave may decay to an electron cyclotron wave whose frequency equals the electron gyro-frequency near the UHR, and an EBW at a lower frequency. As a result, a significant portion of the incident wave power will be absorbed at the plasma edge and electrons are strongly heated. This nonlinear Landau damping could much reduce the electron heating efficiency in the core plasma, and significantly affect the edge plasma properties.

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