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Nonlinear plasma-wave interactions during ion cyclotron wave heating[1] NONG XIANG, University of Colorado at Boulder, JOHN R. CARY, University of Colorado and Tech-X corp., C.Y. GAN, Institute of Plasma Physics, CAS — Ion cyclotron resonant frequency (ICRF) heating has been proved to be an efficient method to heat ions in fusion devices. For present and future ICRF heating experiments, the input power is usually over mega-watt. As a result of such high input power, nonlinear wave-particle interaction may play a very important role in the process of ion heating. To fully account for the plasma-wave interaction physics, computer simulations are performed using the PIC code implemented in VORPAL framework (C. Nieter and J. R.Cary, J. Comp. Phys. 196, 448 (2004)). It is found that near the lower hybrid resonance(LHR), the parametric decay into an ion wave and a quasi-mode could be triggered as the incident wave frequency is larger than twice the ion cyclotron frequency. Ions are thus heated near the LHR. In addition, ion heating at half-harmonic cyclotron frequencies is also observed, and the heating mechanism is discussed.

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