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ICRH under spatially inhomogeneous wave amplitude GUNYOUNG PARK, Department of Physics, KAIST, C.S. CHANG, New York University and KAIST — Ion cyclotron resonance heating of plasma ions is studied both numerically and analytically under an RF wave which has spatially inhomogeneous amplitude. Test particle wave-particle interaction is rigorously simulated in 6-dimensional phase space using a Lorentz equation of motion. It is found that the usual quasilinear heating operator is valid when the wave amplitude is spatially homogeneous. However, as the variation of the wave amplitude over a gyro radius becomes non-negligible, the heating dynamics changes dramatically and the well-known quasilinear heating operator is no longer valid. Both uniform magnetic field and non-uniform tokamak magnetic field geometries are examined. It is observed that the torsion and curvature of the magnetic field, through modification of gyroangle dynamics, can also lead to a non-negligible correction to the heating rate. An analytic theory is developed together, using a spatially varying wave amplitude without a Fourier decomposition of the wave field. An improved quasilinear heating operator is derived.

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