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Single particle model of Alfvén wave heating at plasma edge[1] C.A. SCHUCH, MIT, T.E. EVANS, General Atomics, D.M. ORLOV, UCSD — Alfvén wave heating is an active area of research due to its importance in toroidal magnetic confinement devices and space physics. A theoretical model describing the motion of charged particles under the influence of Alfvén waves is developed for linear and circularly polarized plane waves, largely following the approach laid out by R. White [1]. A simplified slab geometry with a uniform background magnetic field is used in order to facilitate the calculations. The resulting system of differential equations is used to study conditions necessary for resonant heating to occur. The influence of the Alfvén wave amplitude, frequency, and propagation direction on the efficiency of heating is investigated. It is shown that frequencies significantly below the cyclotron frequency may give rise to resonant behavior, resulting in heating of the plasma. The analysis is focused on the parameters typical for the edge plasma region in the DIII-D tokamak.

[1] R. White, L. Chen, and Z. Lin, Phys. Plasmas **9**, 1890 (2002).

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