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Modified Budden problem associated with an energetic-particle population A.N. KAUFMAN, LBNL & UCB, A.J. BRIZARD, SMC, E.R. TRACY, W & M — Our main motivation is to investigate what new effects are introduced in standard heating and/or current-drive scenarios when a non-Maxwellian population of energetic particles (e.g., fusion alphas) is taken into account. In particular, we investigate how energy from a wave supported by a population of energetic particles (e.g., Bernstein wave) can be transferred to a bulk-ion wave through the intermediary of a magnetosonic wave. For this purpose, a three-wave Budden model with two resonance layers is constructed that allows recirculation of energy fluxes around a rectangle in ray phase space. The transmission, reflection, and conversion coefficients for this extended Budden problem are calculated by ray phase- space methods and the modular-eikonal approach [1,2]. The analytical and numerical results show that all of the connection coefficients exhibit interference effects that depend on an interference phase that can be calculated from the coupling constants at each conversion point and the area enclosed by the rectangle. When one of the three waves is a negative-energy wave supported by an inverted energetic-particle population, the magnitude of the conversion coefficients can exceed 100%. Such amplification effects may provide a new form of alpha- channeling.
[1] Y. M. Liang, *et al.*, Phys. Lett. A **193**, 82 (1994).
[2] A. J. Brizard, *et al.*, Phys. Plasmas **5**, 45 (1998).

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