



## **Ion heating by a spectrum of obliquely propagating low-frequency Alfvén waves**

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Ion stochastic heating by a monochromatic Alfvén wave, which propagates obliquely to the background magnetic field has been studied in [Chen et al., *Phys. Plasmas*, 8, 4713(2001)]. It is shown that ions can be resonantly heated at frequencies a fraction of the ion cyclotron frequency when the wave amplitude is sufficiently large. In this paper, the monochromatic wave is extended to a spectrum of left-hand polarized Alfvén waves. When the amplitude of the waves is small, the components of the ion velocity have several distinct frequencies, and their motions are quasi-periodic. However, when the amplitude of the waves is sufficiently large, the components of the ion velocity have a spectrum of continuous frequencies near the ion cyclotron frequency due to the nonlinear coupling between the Alfvén waves and the ion gyromotion, and the ion motions are stochastic. Compared with the case of a monochromatic Alfvén wave, the threshold of the ion stochastic heating by a spectrum of Alfvén waves is much lower. Even when their frequencies are only several percent of the ion cyclotron frequency, the ions can also be stochastically heated. The relevance between such heating mechanism and solar coronal heating is also discussed.