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Effect of the magnetized parameter on particle acceleration in 2D Alfven turbulence

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Coherent large amplitude MHD waves are ubiquitous in space, and they are considered to play crucial roles in the acceleration of high energy cosmic rays. A number of models of large amplitude Alfven generation accompanying cosmic ray acceleration have been proposed so far [1-3]. In 2009, by 1D simulation, Matsukiyo and Hada [4] showed that a relativistic Alfven wave in a pair plasma is unstable to form the coherent standing wave form which consists of counter propagating Alfven waves. Recent studies have also shown that when the amplitude of the two counter-propagating Alfven waves exceeds critical amplitude any particles irreversibly gain relativistic energy within a short time regardless of their initial energy [5].

In this study, we investigate the particle acceleration in 2D Alfven wave turbulence where the long-time evolution of parametric instability could be different from that in 1D. It is clarified that the particle acceleration process strongly depends on the magnetized parameter (σ) due to the difference in the rate of decay process. In this talk, we discuss the effect of σ on particle acceleration in 2D Alfven turbulence.

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