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On the flow driven Alfvenic instability in anisotropic permeating plasmas

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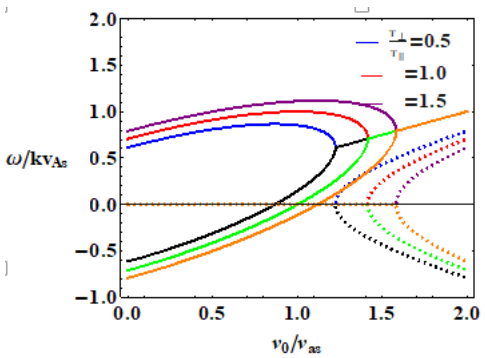
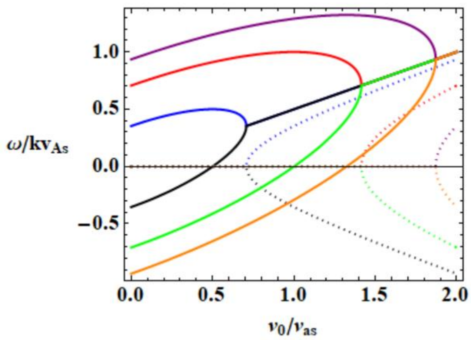
In certain space plasma regions, when multiple plasmas interact and their constituent species penetrate one another, they are referred to as interpenetrating plasmas. This interaction can destabilize the region [1,2,3,4,5]. Alfven wave instability may may occur when Alfven wave experience destabilization [6].

The present investigation derives the dispersion relations of the Alfven wave for the case when one thermally anisotropic quasineutral plasma propagating with constant speed v_0 through another static quasineutral plasma. The dispersion relation of the two oppositely propagating Alfven waves are substantially modified due to the flow speed of fast moving plasma along with the thermal temperature anisotropy. Positive and negative solutions are obtained. Thermal temperature anisotropy together with large flow speed exceeding the Alfven speed in the static plasma make negative solutions non-propagating and represent a spatial variation of the electromagnetic field. The negative solution becomes a forward mode and merge with the positive one. This merging represents the starting point for a flow-driven instability. The energy for the instability is microscopic kinetic energy of the flowing plasma. The dynamics of plasma particles caused by such a coupled wave still remains similar to the ordinary Alfven wave. This means that well-known stochastic heating by the Alfven wave may work, and this should additionally support the potential role of the Alfven wave in the coronal heating.





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Note: This is an unpublished work.