Field-aligned magnetosonic mode of FLR oscilations in a hot plasma

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The theory of the Field Line Resonance(FLR) has been studied by many workers(Tamao,1965,1969; Radoski,1971a,b; Southwood,1974; Chen and Hasegawa,1974), and is widely used to explain the generation mechanism of long-period magnetic pulsations in the cold magnetosphere. A fast magnetosonic wave can couple with a transverse Alfven wave in an inhomogeneous cold plasma.For a finite-beta (equal to one) plasma with non-uniform magnetic field in the x-direction, treated in Cartesian coordinates, a field-aligned magnetosonic mode was found to be excited in FLR (Yumoto,1985).The slow magnetosonic wave of FLR was also discussed by Cheng et al (1993), for finite beta plasma in general magnetic field geometries.

Nakamizo and Iijima (2003) recently found that disturbances observed in the plasmasheet show a diamagnetic nature during substorms. However, it is unclear if this diamagnetic (or slow) mode is associated with the FLR in the hot plasma-magnetotail.

In present study, we will discuss an FLR theory in a hot plasma (Yumoto,1985) in comparison with that in a cold plasma (Southwood,1974), and show a nature of numerically analyzed modes of the FLR oscillations in a hot plasma.