The author has made a theoretical study on wave particle interactions in the whistler mode with a view to explain some of the features of Very Low Frequency (VLF) emissions observed in the magnetosphere. These VLF emissions occur in the range from 300 to 30,000 Hz, and are observed in mid and high latitude stations in close association with naturally occurring whistlers. These have a variety of frequency time structures e.g. risers, falling tones, hooks, inverted hooks and long enduring oscillations. These emissions can also be triggered by man made signals like morse pulses. It is important to note that the dashes (150 m.s) produce emissions while the dots (50 m.s) very rarely do. Furthermore, the triggering is found to be more frequent for the pulses of the frequency which is equal to half the minimum gyro-frequency. The generation mechanism of these emissions and the formation of their frequency time structure seem to be quite complex and the author has made a modest attempt to invoke a mechanism which could
generate these emissions as well as their frequency time structure.

Gyro-resonance interaction between the whistler mode waves and the energetic electrons is believed to be the mechanism underlying the triggering of VLF emissions. The linear theory does not give a satisfactory explanation of the various frequency time structure of these emissions and so the nonlinear theory has to be developed. Furthermore these emissions occur in the magnetosphere and therefore the nonlinear theory should include the effect of nonuniformity of the magnetic field, which produces the second order resonance when the change in doppler shifted frequency seen by the electron is equal to that of its own gyro frequency.

The first chapter reviews the experimental observations and theories of VLF emissions. The merits and demerits of the available theories have been pointed out. Chapter II deals with interaction of a whistler mode wave with a particle distribution, which is modified due to a large amplitude electromagnetic wave background. In chapter III, we have
studied the interaction of a particle with two whistler node waves and also the existence of whistler side bands. The nonlinear interaction of particle with a whistler node wave packet in presence of nonuniform magnetic field has been studied and the resulting frequency time structures are presented in chapter IV. Chapter V summarises the results of present work and also the scope for the further studies is outlined.

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