[SO01] Absorption and Propagation of waves in a Three-ion Plasma Around the Ion Cyclotron Range of Frequencies

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In a plasma consisting of at least two ion species with different charge-to-mass ratios, the existence of perpendicular resonances will greatly modify the wave propagation characteristics around the ion cyclotron range of frequencies (ICRF). We investigate the problem of the wave propagation in three-ion cold plasmas around the ICRF when waves are incident nearly perpendicular to the ambient magnetic field. We calculate the absorption near the ion-ion hybrid resonance in an exact manner by adopting the invariant imbedding method (IIM). With the IIM, we obtain quantitative and accurate values for simple dissipation and mode conversion, respectively, when waves are incident. The transverse waves tend to be dissipated near the ion-ion hybrid resonance. And the incoming waves are expected to remain electromagnetic (EM) waves. When the parallel wave number is very small and the magnetic field is uniform, the ion-ion hybrid resonance depends on the relative concentration of the ion species. And we can estimate the relative ion concentration by analyzing resonance frequencies between two ion cyclotron frequencies. We will compare our study with a statistical study of Pc1-2 magnetic pulsations in the equatorial magnetosphere in which the spectral structure of electromagnetic ion cyclotron (EMIC) waves has been shown to be affected by the presence of heavy ions.

[SO02] Solar wind effect on the propagation of CME-associated interplanetary shocks

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The travel times of CME-associated interplanetary (IP) shocks to 1 AU can be predicted by the empirical shock arrival (ESA) model of Gopalswamy et al. [2004], based on a constant IP acceleration. We evaluate the ESA model using 56 IP shocks identified from sudden commencements/sudden impulses at the Earth and by examining the solar wind data from the ACE satellite during the period of 2000-2002. Out of 56 CME-IP shock pairs, 34 (61%) events were predicted within ±12 hours from the ESA model. Most of events (91%, 31 of 34 events) were in a range of the CME initial speed (VCME) of 400-1300 km/s. Comparing the predicted (Tmod) and observed (Tobs) shock arrival times, we find that the deviations (Tobs-Tmod) of shock arrival times from the ESA model strongly correlate with the difference in VCME and IP shock speed (VSH) ($R = 0.89$) as well as the difference in VCME and the solar wind speed (VSW) just before the IP shock ($R = 0.88$). Using the VCME-VSH and VCME-VSW regressions, we revise the ESA model and predict ~90% of 56 events within ±12 hours from perfect agreement. Our results suggest that further study of solar wind effect on the propagation of the IP shock associated with slower (VCME < 400 km/s) and faster (VCME > 1300 km/s) CMEs is required to improve the prediction accuracy of the ESA model.