Kinetic Alfven Waves (KAW) eigenmode in Magnetic Reconnection

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Kinetic Alfven Wave (KAW) is the extension of the shear Alfvén wave branch into the regime of small transverse wavelength. In a thin current sheet, confined KAW eigenmodes can form as the transverse wavelength becomes comparable to the sheet thickness. In this talk, we present theoretical explanations indicating that Hall fields in collisionless magnetic reconnection are a manifestation of KAW eignmode. Evidence for this theoretical interpretation include 1) the ratio of the Hall electric field (E_hall) to the Hall magnetic field (B_hall) is on the order of the Alfven speed; 2) the Hall electric field is mainly balanced by the ion pressure gradient; 3) the field-aligned current associated with the Hall fields is a distinct feature of KAW/Alfven waves. Predictions of this interpretation in PIC simulations and space observations will be described.

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