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N. André, ESTEC & CESR

From a theoretical point of view, the presence of a plasmaspheric wind has been considered to result from a plasma interchange motion driven by an imbalance between gravitational, centrifugal and pressure gradient forces (Andre and Lemaire, 2006).

Gold (1959) was the first to introduce the concept of interchange of magnetic flux tubes in the magnetospheric context. Its so-called strict interchange assumes a one to one interchange between magnetic flux tubes enclosing the same magnetic flux and thus leaving the shape of the magnetic field lines unchanged as well as the magnetic energy of the system unperturbed. Cheng (1985) pointed out much later that this model is at odd with the requirement of total pressure balance, and that a realistic flux tube interchange must be accompanied by a change in field magnitude. The so-called generalized interchange model of Southwood and Kivelson (1989) still assumes that the interchanging flux tubes preserve everywhere the direction of the local magnetic field, but they relax the condition that the energy density of the magnetic field is unperturbed by the interchange. Both models are in fact unphysical, insofar as true interchange motions of plasma elements generally entail also distorsions of the distribution of magnetic field lines preserving the equilibrium total pressure (plasma plus magnetic pressure). The presence of stratification of the plasmaspheric pressure distribution and of non-electromagnetic forces leads in fact to the destabilizing of a broader category of modes driven by buoyancy forces, known as quasi-interchange modes that trigger transverse as well as translational plasma motions (Newcomb, 1961; Ferrière et al., 1999; Ferrière and André, 2003).

These modes can become unstable in the limit of small parallel wave vector, k_{par}, and fall into two types in the limit of zero parallel wave vector, k_{par} -> 0. The type 1 quasi-interchange mode or transverse interchange mode corresponds to plasma motions which are predominantly perpendicular to magnetic field lines and results in the exchange of plasma elements across magnetic field lines. The type 2 quasi-interchange mode or translational mode corresponds to motions of the plasma predominantly along flux tubes.

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