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# Transverse Alfvén wave instabilities and filament formation

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An important problem in magnetospheric plasmas consists in characterizing the coupling between Alfvén waves, which are the main vectors for energy transport, with the small-scale coherent structures responsible for energy dissipation. In many cases filaments are observed, an indication that Alfvén waves transverse instabilities play a key role in mediating large and small-scale processes. Observational evidences of the coexistence of both Alfvén waves and small-scale structures will be given for regions such as the magnetosheath, close to quasi-perpendicular shocks, and the magnetosphere, close to auroral regions. A brief review of the nature and conditions for Alfvén wave filamentation will be given, including in the situation of a collisionless plasma, taking into account Landau damping [1-3]. Recent simulations of Alfvén wave filamentation in Hall-MHD will also be presented that show the formation of thin magnetic tubes, their disruption and the onset of a hydrodynamic regime with intense plasma jets, potential sources of further destabilization of the plasma [4].

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