Modelling Aurora-Type Phenomena by Short Wave-Long Wave Interactions in Multi-D Large MHD Flows

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We study a model for aurora type phenomena, where a short wave, governed by a nonlinear Schrödinger equation, propagates along the streamlines of a compressible magnetohydrodynamic fluid flow. Due to the possible occurrence of vacuum and the lack of regularity of the solutions, the Lagrangian transformation, upon which the model is based, may become singular; particularly if large initial data is allowed. To overcome these difficulties we propose a regularized system and study existence of solutions and their convergence as the regularizing parameters vanish. This lecture is based on a joint work with Hermano Frid and Ronghua Pan.