A Mechanism for $E \times B_0$ Structure Formation

PATRICK DIAMOND, WCI Center for Fusion Theory, N.F.R.I. and UCSD, OZGUR GURCAN, Ecole Polytechnique, T.S. HAHM, Seoul National University, GUILHEM DIF-PRADALIER, CEA Cadarache — A novel mechanism for $E \times B_0$ staircase formation is proposed.

Staircases are quasi-regular patterns of strong, localized shear layers and profile corrugations interspersed with regions of avalanching. The critical question is how do such quasi-regular patterns self-consistently form. We propose a simple model based on a.) symmetry constraints on the form of the flux, b.) the existence of a fluctuation amplitude dependent time delay between the profile perturbation and the flux. The time delay leads to the development of quasi-periodic jams or clusters in the transport flux. These in turn nucleate profile corrugations and a shear layer staircase. The implication for avalanche structure will be discussed. The aim of this work is a self-consistent treatment of the spatio-temporal structure of transport and flows.

Patrick Diamond
University of California, San Diego

Date submitted: 13 Jul 2012