# APPLICATION OF EVOLUTIONARY COMPUTING TO THE ANALYSIS OF NONLINEAR SYSTEMS

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Magnetic reconnection is arguably the most efficient transport and energy conversion mechanism in almost ideal plasmas. Reconnection controls the overall dynamics in space and astrophysics plasmas, as well as in many laboratory plasma systems. Reconnection operates by means of a localized diffusion region, where deviations from the plasma idealness condition generate electric fields and permit plasma transport even far away from the diffusion region itself. Recent advances in analytic theory and computer modeling have begun to shed light on the internal dynamics of the diffusion region. In particular, we begin to understand the delicate nature of the force balance in the inner diffusion region, where particles can become unmagnetized and where electric field forces are important. This presentation will provide a brief introduction of the reconnection process and its applications. This introduction will be followed by a detailed analysis of the current understanding of dissipation region physics, and by an outlook toward future research.