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Transport characteristics in a stochastic magnetic field with self-consistently described anomalous perpendicular transport

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An artificial stochastization of magnetic field lines, realized in the concept of Ergodic Divertors (ED), is considered as an efficient tool to influence the transport properties at the plasma edge. Through the modification of plasma parameter profiles this can change the transport perpendicular to the field lines, which in turn is essentially involved into models for stochastic layers [1-3]. The perpendicular transport is normally of anomalous nature and at the plasma edge is dominated by micro-instabilities such as drift Alfvén, drift resistive and drift resistive ballooning modes. Additionally there are direct effects of stochastization on these instabilities, e.g., through the plasma flows along perturbed field lines arising due to plasma recycling.

In this contribution we present a transport model which combines the description of effective transport in a stochastic layer from Ref.[3] with recently developed semi-analytical model for the edge anomalous transport due to drift instabilities [4]. The first results of calculations for plasma parameter radial profiles by using the model presented will be discussed and compared with the experimental data from tokamaks Tore Supra and TEXTOR. An explanation for the formation of a region with a steep temperature gradient observed in Tore Supra in discharges with Ergodic Divertor is proposed.

[1] A.B. Rechester and M.N. Rosenbluth, Phys. Rev. Lett. **40**, 38 (1978).

[2] Ph. Ghendrih, H. Capes, F. Nguyen and A. Samain, Contrib. Plasma Phys. **32**, 179 (1992).

[3] M.Z.Tokar, Phys. Plasmas, **6**, 2808 (1999).

[4] X. Loozen and M.Z.Tokar, to be submitted to Plasma Phys. Control. Fusion.