Influence of magnetic topology on particle and heat flux deposition patterns on TEXTOR with Dynamic Ergodic Divertor

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The Dynamic Ergodic Divertor [1] on TEXTOR imposes three dimensional stochastic magnetic field lines in the plasma boundary [2]. The resulting heat and particle deposition patterns of the divertor target depend strongly on a magnetic topology, including radial penetration of magnetic field lines within first few toroidal revolutions and field line connection lengths. In this work the heat and particle deposition patterns are studied at different levels of collisionality. It has been found that the heat flux formed by the electrons streaming along the field lines with shallow penetration is only seen at low collisionalities, while these field lines reach areas of low electron temperature. The other class of field lines penetrates relatively deep within first few toroidal turns reaching plasma region with much higher electron temperature, which makes parallel transport much more effective, even at the higher level of collisionality.

[1] K.H. Finken (guest editor), *Special issue devoted to the DED,* Fusion Eng. Des., **37** (1997)
[2] M.W. Jakubowski, O. Schmitz, et al., Phys. Rev. Lett., **96** (2006) 035004