Abstract Submitted
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Favorable effects of turbulent plasma mixing on the performance of innovative tokamak divertors[1] D.D. RYUTOV, LLNL, R.H. COHEN, Retired, T.D. ROGNLIEN, M.V. UMANSKY, LLNL — The problem of reducing the heat load on plasma-facing components is one of the most demanding issues for MFE devices. The general approach to the solution of this problem is the use of a specially configured poloidal magnetic field, so called magnetic divertors. In recent years, novel divertors possessing the 2-nd and 3-rd order nulls of the poloidal field (PF) have been proposed. They are called a "snowflake" (SF) [1] and a "cloverleaf" (CL) [2] divertor, respectively, due to characteristic shape of the magnetic separatrix. Among several beneficial features of such divertors is an effect of strong turbulent plasma mixing that is intrinsic to the zone of weak PF near the null-point [3]. The turbulence spreads the heat flux between multiple divertor exhaust channels and increases the heat flux width within each channel. Among physical processes affecting the onset of convection the curvature-driven mode of axisymmetric rolls is most prominent. The effect is quite significant for the SF and is even stronger for the CL divertor. Projections to future ITER-scale facilities are discussed.

[1] D.D. Ryutov. Phys. Plas., 14, 064502 (2007);
[2] D.D. Ryutov, M.V. Umansky. Phys. Plas., Submitted, June 2013;
[3] D.D. Ryutov, R.H. Cohen, T.D. Rognlien, M.V. Umansky. PPCF, 54, 124050 (2012).

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D. D. Ryutov
LLNL

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