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A snowflake divertor: reduction of the ELM heat load due to plasma convection D.D. RYUTOV, R.H. COHEN, T.D. ROGNLIEN, M.V. UMANSKY, Lawrence Livermore National Laboratory — A snowflake magnetic configuration is created when the poloidal magnetic field and its spatial derivatives turn zero at a certain point. The separatrix then acquires a characteristic hexagonal shape reminiscent of a snowflake and the number of divertor plate strike points increases from two to four. We point out that the snowflake divertor could solve the ELM heat load problem by spreading the heat over a large area and engaging all four strike points. The mechanism is related to a fast increase of the plasma beta in the divertor region during ELM. Due to very low values of the poloidal magnetic field over a large area of a snowflake divertor, plasma convection sets in that leads to the desired effect. Conditions for the onset of a convective instability and/or the loss of equilibrium are formulated, and estimates of the size of the zone involved in convective motion are presented. Work performed for U.S. DoE by LLNL under Contract DE-AC52-07NA27344.

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