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General properties of the magnetic field in a snowflake divertor D.D. RYUTOV, M.A. MAKOWSKI, M.V. UMANSKI, Lawrence Livermore National Laboratory, Livermore, CA 94551, USA — The power-law series for the poloidal magnetic flux function, up to the third order terms, are presented for the case where two nulls of the poloidal magnetic field are separated by a small distance, as in a snowflake divertor. Distinct from the earlier results, no assumptions about the field symmetry are made. Conditions for the realization of an exact snowflake are expressed in terms of the coefficients of the power series. It is shown that, by a proper choice of the coordinate frame in the poloidal plane, one can obtain efficient similarity solutions for the separatrices and flux surfaces in the divertor region: the whole variety of flux surface shapes can be characterized by a single dimensionless parameter. Transition from a snowflake-minus to snowflake-plus configuration in the case of no particular symmetry is described. The effect of the finite toroidal current density in the divertor region is assessed. A possibility of creating a near-snowflake configuration in the ITER-scale facilities is discussed. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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