

The Effect of Magnetic Field on Dust Charge and Transport in Divertor Plasma

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The mechanism of dust production and its confinement in plasma are actual problems, thus many scientists have been well studied both theoretically and experimentally [1-3]. Determination of the mechanism of dust production, study of dust-plasma interaction and interaction of dust with surface of fusion reactor, dust transport, impact assessment of dust on the characteristics of the reactor and the safety of fusion devices - all these questions are very relevant in present investigation of fusion problems.

In this work the influence of magnetic field on the dust charge and transport in the divertor plasma are investigated. Effect of magnetic field on the charge of dust particles can play a significant role in shaping the edge plasma, since the dust transport, their evaporation determines the composition of the edge plasma, and, accordingly, its transport properties. The dust particle charge was calculated using the Particle-in-Cell method, whereas the number of collisions between ions and atoms was determined by the Monte Carlo method [4-6]. The results of calculations show that the magnetic field starts to affect the dust particle charge when its strength reaches a certain critical value determined from the equality of the electron gyro-radius and the diameter of the dust particle. It has been shown that the magnetic field can have a significant impact on the process of charging of the dust particle in the divertor plasma considerable changing its path and lifetime.

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