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Transport of dust particles in fusion devices A.YU. PIGAROV, S.I. KRASHENINNIKOV — Large production rates and spreading of dust throughout the device volume are very important safety issues for next-step fusion projects (both: magnetic and inertial). A physical model for dust transport includes the dynamics dust-plasma, dust-turbulence, and dust-surface interactions. The dynamics is strongly coupled to heating, charging, erosion, evaporation, and thermo-chemical properties of dust particles. Recent developments in the model and their impact on the dust motion are highlighted. The model is incorporated into the DUSTT code [A.Pigarov, PoP 12 (2005) 122508]. Results of carbon-dust dynamics and transport in plasma are shown for NSTX and DIII-D tokamaks. The simulations demonstrate that dust particles can be very mobile, accelerate to large velocities (>100 m/s), and penetrate deeply toward plasma core. Predictions for dust penetration into ITER plasma are also presented. Under standard tokamak plasma conditions, dust particles experience the net erosion or sublimation. However, as discussed, in some cases (for example, parasitic plasmas that occur underneath a dome), the dust particles can even grow from net deposition when a low-Te low-density plasma contains significant concentrations of impurities. Modeling is presented for transport of dust particles outside the working chamber, i.e. in pumping or diagnostics ports. Results of multi-parametric analysis of dust penetrability are discussed. Work supported by USDoE grant DE-FG02-04ER54739.

Alexander Pigarov
UCSD

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