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Impact of dust originated impurities on fusion edge plasmas[1] R.D. SMIRNOV, S.I. KRASHENINNIKOV, A.YU. PIGAROV, UCSD, T.D. ROGNLIEN, LLNL, A.L. ROQUEMORE, D.K. MANSFIELD, C.H. SKINNER, PPPL, J. NICHOLS, Cornell Univ. — The impact of dust originated impurities on fusion edge plasmas is analyzed using coupled DUSTT/UEDGE code, which allows self-consistent modeling of dust and plasma transport in the edge. The code validation is performed using 3D reconstructed dust trajectories measured on NSTX. Various scenarios of injection of dust particles with different sizes, speeds, and composition materials are simulated and compared with available experimental data from NSTX and other tokamaks. The modeling demonstrates that dust injected with rates of order or larger than 10mg/s has profound effects on the edge plasma profiles, transport, and stability. In particular, it is shown that the plasma contamination with the dust originated impurities can lead to substantial increase of the radiation power losses and decrease of the radial pressure gradients and of the radial plasma fluxes in the edge. Significant reduction of the power load to the divertor plates is also observed for the simulated dust injection rates. The differences between the injection of dust and of equivalent amounts of gaseous impurities are discussed.

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