Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Dust in Fusion Plasmas: Modeling Approach[1] R.D. SMIRNOV, A.YU. PIGAROV, S.I. KRASHENINNIKOV, M. ROSENBERG, D.A. MENDIS, UCSD — The confinement of enormous energy in the plasma of future fusion devices presents numerous challenges associated with unavoidable interactions of the plasma with bounding walls. The interactions both continuous and intermittent lead to destruction of the walls with the release of a significant amount of wall material in the form of atoms, clusters and dust into the plasma. It appears that the dust is not directly affected by the magnetic field and may have a shorter path toward the plasma core, delivering impurities to it. Part of the impurities re-deposits on the plasma facing surfaces as thin films, stimulating further dust production. While in the plasma, the dust particles driven by plasma flows acquire large speeds, this leads to dust spreading over the volume and the surfaces of a fusion device. Taking into account the high reactivity of the dust and its ability to retain tritium, dust also presents important safety issue in the next-step fusion devices. In this work we report on recent progress in numerical simulation efforts with the DUSTT code toward understanding the dust behavior in fusion plasmas. Dust dynamics, transport, statistics, and impact on the plasma are considered.

[1]Work supported by USDoE grant DE-FG02-04ER54852 at UCSD.

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Date submitted: 17 Jul 2007 Electronic form version 1.4