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Dust particle spin-up caused by cross-field plasma flow and turbulence. P.K. SHUKLA, Ruhr-Universitaet Bochum, Germany, V.I. SHEVCHENKO, S.I. KRASHENINNIKOV, UCSD, USA — Spinning of dust particles adds new interesting features to dust particle dynamics and to the dusty plasma physics. Several reasons for dust particle spin-up have been suggested (e.g. Ref. 1): i) sheared flow of plasmas around charge dust particles, ii) dust particle surface irregularities, and iii) sheath effects resulting from the interactions of a charge dipole of a dust particle (caused by plasma flows into the sheath) with the sheath electric field. Here we present a novel mechanism for charged dust particle spin-up. The physics of the present mechanism is simple and robust, and is associated with the interaction of a charge dipole of a dust particle, **D**, induced by the **E**x**B** cross-field flow of a magnetized plasma (**D** $\propto$ **E**x**B**), where **E** and **B** are the electric and ambient magnetic fields. Since the resulting torque is proportional to $\mid \mathbf{E} \mid^2$, the presented mechanism of charged dust particle spin-up works for both stationary and non-stationary (turbulent in particular) electric fields. In many cases the turbulent electric field stremgth is much larger than the laminar one so that the impact of turbulence can be dominant. We present theoretical analyses for charged dust particle spin-up and estimate the maximum value for the angular velocity charged dust particle can acquire due to our new spin-up mechanism. [1] N. Sato "Spinning Motion of Fine Particles in Plasmas", AIP Conference Proceedings No. 799, p. 97; AIP, New York, 2005.

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