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Magnetic field structure generation in collisional dusty plasmas<sup>1</sup> PADMA KANT SHUKLA, FERNANDO HAAS, Institute for Theoretical Physics IV, Ruhr University Bochum, D-44780 Bochum, Germany — A perpendicular ion drift is proposed as a possible mechanism for the generation of magnetic field structures in a highly collisional dusty plasma. The basic dissipation mechanism is assumed to be the dust-neutral momentum exchange, so that plasmas with a small ionization fraction are natural candidates for experiments. The model reduces to a nonlinear partial differential equation for the vector potential. The conditions for linear instability are presented. Possible stationary states are periodic arrangements for the magnetic field, described by a Lienard equation. The fully depleted (ion-dust) case is also considered in detail. Applications of the present work to magnetic field structures in planetary rings, comets and low-temperature dusty plasma experiments are discussed. A necessary condition for the validity of the model is a sufficiently slow time-scale of the generated magnetic fields in dusty plasmas.

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