

Dusty Plasma in Space Sciences

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What differentiates a dusty plasma from an usual one is the presence of massive particulates of different forms and sizes. They are either positively or negatively charged depending on the surrounding plasma environment. Then a dusty plasma can be defined as a complex admixture of charged particulates, electrons, ions and neutrals. It exhibits new and unusual behavior, and provides the possibility to explore new collective modes of oscillation, instabilities, as well as new coherent nonlinear structures. It can be found everywhere starting with the interplanetary space, comets, planetary rings, earth's atmosphere and can be produced and studied in laboratory conditions. It seems to play an important role in fusion plasma devices. The aim of this talk is to review some situations from space science and laboratory experiments where dusty plasma exists. The basic characteristics of this complex system are briefly mentioned. Further on different linear waves (dust acoustic waves, dust ion-acoustic waves, dust lattice waves) are discussed, and a special attention is given to the topic of possible nonlinear structures (solitary waves, envelop solitons, shock waves) which can exist in a dusty plasma. The last twenty years have seen a growing interest in studying the physics of dusty plasma, and now it became a new discipline of plasma science with many and interesting applications.