

DIVERGENCE OF THE TRAJECTORIES OF DUST PARTICLES IN PLASMA-DUST SYSTEM

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The statistical physics, thermodynamics (entropy and thermostatmodel), concepts of equilibrium and partial equilibrium are crucialfor dusty plasma description. The problem of estimation of dustyplasma entropy is under consideration.All approaches of thisresearch are based on analytical and theoretical approach,and alsoon molecular dynamics simulation of dusty plasma system.In the model of dusty plasmas the divergence of trajectoriesallows tocalculate K-entropy (Krylov–Kolmogorov–Sinai entropy).

The valueof K is also equal to averaged maximum Lyapunov exponent andentropy growth rate since reciprocal is an important relaxation time.Furthermore, predictability time is studied. This time characterizesthe time interval, during this interval future behavior of adynamicsystem based on the initial conditions and deterministic dynamicequations can be predicted.The molecular dynamics simulation shows that the time of trajectories divergence might be different in different directions, so the partial equilibrium subsystem can be observed in the system. Estimations for the characteristic time of divergence in different directionsof dust particles motion are obtained. The method for entropy is estimated for conditions of standard laboratory experiment on dustyplasma. The applicability of the thermodynamic functions for thedescription of plasma-dust system is discussed.

References

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