



Multiscale self-organized triple Beltrami states in four-component dusty plasmas

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A possibility of four component dusty plasmas to self-organize to Triple Beltrami state (a linear combination of three force-free Beltrami states) has been explored. It is found that the system attains a Triple Beltrami state when the velocities of electrons and ions become parallel to magnetic field while the two oppositely charged dust grains follow the generalized vorticities. The impact of the densities of species, masses of charged dust grains and Beltrami parameters on the formation of self-organized structures has also been investigated. The present work is useful to study and understand the multi scale magnetic field structures formed in planetary bodies such as ionosphere of Mars, Titan's lower ionosphere, etc. and in laboratory plasmas.

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