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Investigation of forces affecting dust particle alignment in cross polarization (Conference Paper)

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Abstract

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This paper implicitly discusses method of using dual orthogonal polarizations to optimally conserve frequency spectrum. This has, in the recent time, received considerable interest in the field of electromagnetic wave propagation in sand and dust storms. The realization of a dual-polarized system is thus 1imited by degree of cross polar discrimination that can be achieved between the two orthogna1 channels. Cross polarization discrimination is a parameter widely used to quantify the effects of polarization interference. Apart from non-sphericity of falling dust particles, dust induced microwave cross polarization has been attributed to tendency of the particles to align in a particular direction. This paper investigates and identifies important forces acting on the alignment which are inputs to the cross polarization discrimination evaluation. The method adopted involves the use of reliable measure of turbulence shear, inertial torque and Brownian motion effects. The results showed the influence of the relevant forces on the alignment of the dust particles. Inertial torque becomes a domineering force for systematic alignment at some particle size range. © 2014 IEEE.

Author keywords

Brownian force cross polarization dust storms inertial torque microwave propagation particle alignment turbulent torque

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