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Magnitude and Direction of Fine-Particle Gyrophase Drift¹ JEFFREY WALKER, MARK KOEPKE, West Virginia University, MICHAEL ZIMMERMAN, WILLIAM FARRELL, NASA-Goddard Space Flight Center, VLADIMIR DEMIDOV, AFRL, Wright-Patterson Air Force Base, and West Virginia University — Gyrophase-resonant excursions of magnetized-orbit dust grains in inhomogeneous plasma, causing periodic charge-state changes, may occur in the presence of strong magnetic field and inhomogeneous plasma potential. Gyrophase drift [Northrup and Hill, 1983], resulting from non-zero non-infinite charging rate of a dust grain, results in a perpendicular modification to the usual ExB drift. In plasmas with structured inhomogeneity, this ultimately causes dust grains to leave regions of inhomogeneity and cease both ExB-drifting and gyrophase drifting. In our approach, the motion of a dust grain is computed numerically by a leapfrog method for the Orbit Motion Limited (OML) charging model while the grain executes its gyro-orbit in plasma with either abrupt or gradual inhomogeneity. The causal link between charging-rate details and magnitude and direction of gyrophase drift is evaluated by applying an effective charge-rate parameter in the OML charging model. This parameter can be used to demonstrate the sensitivity of the gyrophase drift vector prediction on any model's charging rate details.

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