Geophysical Research Abstracts,
Vol. 11, EGU2009-2310-1, 2009
EGU General Assembly 2009

Dust density waves and spoke formation in Saturn's ring

V. V. Yaroshenko (1), M. Horanyi (2), and G. E. Morfill (1)

(1) Max Planck Institute for Extraterrestrial Physics, Garching, Germany (viy@mpe.mpg.de), (2) University of Colorado, Boulder, USA

One of the most intriguing features observed in Saturn's ring are the radial wedge-shaped inhomogeneities (so called spokes) which appear exclusively near the synchronize orbit in the broad B ring. The photometric properties of the spokes show that they are comprised of submicron dust particles. To explain spoke formation we consider dust density waves in a model of a thin differentially rotating dusty plasma disk. The group of spokes is interpreted as an envelope soliton of dust density waves propagating along the B ring. The wave crests of the internal soliton filling, where the dust concentration is at its highest, are associated with individual spokes. A triggering mechanism for the excitation of such dust density waves can be a dissipative instability due to the plasma drag force developing in the vicinity of the synchronize orbit. We discuss the arguments pro and contra the wave theory of spoke generation and formulate the effects which could verify validity of this mechanism on the basis of future Cassini observations.