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Scattering properties of circumsolar dust grains

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Several observations in the F-corona have detected the peaks in the infrared flux around $4R_{\odot}$. The mechanism to form the solar dust ring is based on the dynamical behaviour of grains near the sun and the observed flux peak in the infrared at $4R_{\odot}$ can be explained as the combination of thermal and the scattered light from such a solar dust ring consisting of grains suffering sublimation. Though these models have succeeded in constructing the dust ring near the sublimation zone of grains there still remains some uncertainty in identification of the material of the circumsolar dust grains. The analysis of the observed data suggests that the circumsolar particles might be larger and inhomogeneous (i.e.porous and fluffy). In view of these observations we calculate the scattering intensity, polarization and albedo of the porous and fluffy particles. For these calculations we use discrete dipole approximation (DDA). The DDA replaces a solid particle by an array of N dipoles. We apply DDA first to the solid spheroidal grain assumed to be made of a large number of dipoles. Then we systematically reduce the number of dipoles to model the porous grains. We study the scattering phase function, linear polarization and albedo as a function of grain size and porosity. Our results show that the scattering phase function and polarization for the porous silicate particles deviate considerably from the results obtained from those of the solid particles. We also find that in general the albedo for porous particles is lower; which is consistent with the observations. In the present study we have considered the single sized (0.1μm) particles. However, in order to interpret the observed data on the circumsolar dust we should use a size distribution in the size range of 0.001μm to 1.0μm (and larger). These calculations are in progress.