A radiative transfer model of an impact-induced ejecta curtain consisting of dust aggregates

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Impact cratering of celestial bodies produces ejecta curtains that excavate the underground material present in them. Therefore, studies of ejecta curtains help us in understanding the physical and chemical properties of the interior of the bodies. However, remote-sensing observations of such an ejecta curtain is limited to the Moon. In-situ measurements together with Monte-Carlo radiative transfer models of ejecta curtains from an asteroid will enable us to constrain the size and composition of less-processed materials in the underneath regolith layers of the asteroid. Here we have analyzed the dependence of the predicted ejecta curtain scattered intensities on its dust density distribution and phase function. In our model, the density of the ejecta curtain is assumed to increase from the vertex to the base of an ejecta cone and the regolith particles are aggregates of small grains by analogy with lunar agglutinates and dust in debris disks. Apart from that, the orientation of the ejecta curtain is also varied with respect to the direction of stellar photon flux. We show how the intensity depends on the phase function of the grains, by comparison with the Henyey-Greenstein phase function. This study will enable us to gain useful insights into the morphology of the component dust grains.