Pattern in ejecta curtain and the size distribution of target particles: Investigation using filament structure analysis tools

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Impact experiments in laboratories have often used particles of the same size in the case of granular targets. In this case, it has been shown that a mesh-like pattern is produced in the cone-shaped ejecta curtain. On the other hand, when the particles have a size distribution, the ejecta pattern shows a large-scale pattern that covers the entire curtain. In other words, the pattern of the ejecta curtain reflects the size distribution of the target particles.
In recent years, impact experiments have been conducted in asteroid explorations, and the patterns of ejecta observed in-situ differ from that observed in the laboratories for particles of the same size. Images of the asteroid's surface show the presence of boulders of various sizes, and hence, the different patterns may reflect the particle size distribution on asteroid surfaces.
In this study, we discuss the results of ejecta curtain patterns examined using tools for analyzing the filament structure of molecular clouds (e.g. FILFINDER, DisPerSE, RHT (Rolling Hough Transform)) in order to obtain quantitative correlations with target size distributions.

