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Modeling ejecta interactions using KFIX, a 2-fluid hydrocode

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The presence of even a tenuous atmosphere causes the path of ejecta excavated from a growing crater to deviate significantly from the ballistic trajectory followed in a vacuum. The hydrocode KFIX, a two-fluid hydrocode originally written at Los Alamos and maintained at Purdue University by Professor Jay Melosh and his team, has been adapted to study the extent of the ejecta's deviation and the final effect this has on the ejecta blanket's distribution. In this two-fluid approach, the ejecta, modeled as 1 cm diameter particulates with the density of basalt, and the atmosphere, trated as an ideal gas with the molecular weight of Carbon Dioxide, both form a continuum through the computational region. Energy and momentum are exchanged between the two fields as the constituent materials collide and interact. The code has been modified to study the formation of a 4 km diameter, simple crater under modern and ancient Martian conditions. Many of the relationships used to tailor KFIX to this problem arose from the analysis of NASA's Deep Impact mission on comet Tempel 1. [1]

[1] Richardson, J. E. et al. (2007), Icarus 191, 176-209.

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