5.8 LUNAR EJECTA IN HELIOCENTRIC SPACE

W.M. Alexander and M.A. Richards
Baylor University, USA

Studies of the parameters of micron and submicron ejecta particles from laboratory hypervelocity impact experiments have been accomplished using a light-gas-gun to accelerate milligram particles to velocities of 4 km/s onto a basalt like rock target.

Preliminary results give a mass-distribution for the micro-ejecta particles with velocities $\gtrsim 3$ km/s relative to the target. From these results, it is seen that less than 0.03 % of the mass of the 4 km/s primary impacting particle leaves the impact crater with velocities equal to or greater than "lunar" escape velocity.

It is shown that over 80 % of these particles escape the earth-moon gravitational sphere of influence and enter heliocentric space with 1 AU perihelions. Ejecta particles with mass less than 0.75 pg leave the interplanetary system due to radiation pressure. Particles with masses less than 1.47 pg are probably perturbed by Jupiter. Thus, ejecta particles with masses greater than 1.47 pg are injected into an extremely small volume of heliocentric space which is symmetrical to the ecliptic plane. The major force acting on these size particles in this volume is the Poynting-Robertson force. The dwell-time of these particles in the above space is found to be between 600 and 1000 years. Calculations for the resulting spatial density of lunar ejecta in this volume of heliocentric space shows that the spatial density is of the same order of magnitude as the in-situ measurements of Pioneers 8 and 9 and Mariner IV.

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