**PDC2021**

**Vienna, Austria**

*Please submit your abstract at https://atpi.eventsair.com/7th-iaa-planetary-defense-conference-2021/abstractsubmission*

*You may visit https://iaaspace.org/pdc*

*(please choose one box to be checked)*

*(you may also add a general comment - see end of the page)*

**Key International and Political Developments**

**Advancements and Progress in NEO Discovery**

**NEO Characterization Results**

**Deflection and Disruption Models & Testing**

**Mission & Campaign Designs**

**Impact Consequences**

**Disaster Response**

**Decision to Act**

**Public Education & Communication**

**ABLATION EXPERIMENTS OF SIMULATING ASTEROID ENTRY**

**Luo Yue(1), Wang Lei(2), Dang Leining(3), Huang Zhenjun(4), Liu Jinbo(5), Liu Sen(6)\*, Shi Weibo(7)**

*Hypervelocity Aerodynamic Institute of China Aerodynamics Research and Development Center, No.6, South Section Of The Second Ring Road, Mianyang City, Sichuan Province, 86-816-2465363, myheater@sohu.com*

***Keywords:*** *asteroid, entry, ablation, arc-heater, experiment*

##### ABSTRACT

Ablation is one of the most important phenomenon when an asteroid enters the earth atmosphere at hypervelocity, which largely determines the mass loss, flight trajectory, and even radiation characteristics of the asteroid. To research the typical ablation process of asteroids when entering the earth atmosphere, assist the establishment and correction of ablative models, experiments were conducted in an arc heater to simulate the typical conditions of asteroid entry. The blunt-shaped test samples with the head radius of 20mm were made by carbon steel and basalt. In this work, the ablation process of test samples were clearly recorded, in which the melt flow of two different materials and the spallation of fragments as well as vaporization of basalt were observed. The evolutions of emission spectroscopy, recession profile and surface temperature profile during the whole process were acquired. The results indicate that the ablation phenomenon and the mechanism of mass loss of two materials are obviously different: Under the impact of the high-temperature flow, the carbon steel was sputtering into mass of tiny droplets which were washed away by the flow rapidly, while the mass loss of basalt were the shear flow of molten matter with small amount of massive spalling and evaporation spraying. Based on the experiment and simulation, the effective ablation enthalpy of the asteroid material under different conditions were estimated, the relation with the incoming flow condition was fitted, and the volume loss rate of meteorites from the assumed height of disintegration to the moment of landing was calculated.