MASCOT2, a Lander to Characterize the Target of the Asteroid Kinetic Impactor Test (AIM) Mission

Conclusions

MASCOT2 as a long-lived, hopping lander for the AIDA/AIM mission will significantly enhance our understanding of the delta body for kinetic defectors due to its detailed determination of the interior structure of the target asteroid, from its surface characteristics, understanding the surface mechanical and thermal properties. Design studies have proven its feasibility, showing that it is feasible to launch MASCOT2 from a compliant spacecraft (such as DART) and that the landing ellipse dispersion on the surface is now < 20 cm at 3-sigma, with a mean of 9 cm, ensuring that the landing ellipse is small enough to virtually guarantee sufficient safety margins and high accuracy. The spacecraft dispersions are now < 5 cm at 3-sigma, ensuring that the spacecraft ellipse is small enough to virtually guarantee sufficient safety margins. Therefore, the deployment strategy is fully fulfilled, in order of importance:

1) The velocity dispersion (sum of spacecraft velocity dispersion and the one by the separation device) is low enough (order of <1 m/s, 3-sigma).
2) The combined coefficient of restitution (surface and structural, worst-case only structural) is low enough (<0.8).
3) And the positional dispersion at the point of release is low enough (order of <0.2 m).

Then the next step is to test the DART mission and prove its viability by installing and operating the MASCOT2 system on the surface of an asteroid. A reliable deployment (geometric deployment at orbital eccentricity 0.16) is no hindrance to successful deployment.