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RESULTS OF ZPS PENETRATOR TESTS

Abstract

Zodiac Planetary Services, LLC, has developed a concept to prospect the permanently shadowed regions of the lunar poles using a tether-based orbital platform. The ZPS concept allows sampling of the polar craters in various locations to depths of 1 meter within landing a spacecraft on the surface. The orbiting satellite is placed in one of four frozen orbits (100 km altitude, 84.5o inclination), and is comprised of two spacecraft suspended at the end of tethers approximately 105 km long. The system rotates at a rate such that the lowest spacecraft, called a lower winch station is stationary with respect to the lunar surface for short periods of time. As the lower winch station approaches its nadir, a penetrator is ejected from the station, impacts the lunar surface and a sample pouch is withdrawn. ZPS has funded the Arizona State University's Engineering program to design, fabricate and test a penetrator. There a many key issues and risk which will be addressed and resolved as a consequence of these tests. This paper discusses the project, the design and the results of the testing. A companion paper will discuss the penetrator ejection mechanism. A similar Arizona State University effort is being performed on the ejection mechanism.