

**PLANETARY PROBE LASER PROPULSION CONCEPT
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LE, T. ⁽¹⁾, MOBILIA, S. ⁽²⁾, PAPADOPOULOS, P. ⁽³⁾

*⁽¹⁾San Jose State University, One Washington Square, San Jose, CA 95192, USA,
Email:Le.Tina@Yahoo.com*

*⁽²⁾ San Jose State University, One Washington Square, San Jose, CA 95192, USA,
Email:sean.mobilia@students.sjsu.edu*

*⁽³⁾ San Jose State University, One Washington Square, San Jose, CA 95192, USA,
Email:periklis.papadopoulos@sjsu.edu*

ABSTRACT

The objective of this paper is to study a moon-based laser propulsion system to reduce spacecraft fuel consumption and travel time. The study considers a small satellite demonstration traveling to lunar orbit and the proposed system would ultimately be expanded for missions across the solar system. A design tool was written in Microsoft Excel to simulate a laser-assisted solar sail system. From this design tool, an 800 W laser with a 75 cm diameter mirror would result in a constant acceleration of $1.8 \cdot 10^{-8}$ m/s² of the spacecraft. A 10 MW laser with a 10 m diameter mirror would result in an acceleration of $2.2 \cdot 10^{-4}$ m/s² of the spacecraft. With constant acceleration, even a small boost can significantly reduce travel time over the duration of a flight. This particular application can help expand interplanetary travel by providing infrastructure to reduce travel time while decreasing the mass of the spacecraft.