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SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Ignition - Primary Space Education (1)

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ORBITAL MECHANICS AT THE ELEMENTARY SCHOOL-LEVEL; A REAL-LIFE EXPERIENCE.

Abstract

Exciting advancements were recently noted in the field of Mini-satellite technology. Launch costs are predicted, by market analysts, to diminish in the near future. Spaceborne research opportunities are projected to increase in number. The Arkyd space telescope is a USD 1.5M crowd-funded venture of Planetary Resources Inc. (PRI). According to PRI, a 200mm aperture (f4) mirror will act as the main onboard optical component. A resolving power of 1 arcsecond, and astronomical detection capability of up to the 19th magnitude, should be achieved with the onboard motion-stabilized 5MP image sensor. The telescope will provide a unique opportunity for students world-wide to immersively participate in spaceborne research. Another aspect experienced by the students during the mission is the close, realistic encounter with the constituents of a space mission, such as correct utilization of communication links and orbital control. The Arkyd telescope is estimated to deploy at LEO by 2018.

Significant observing time (90 minutes) was pre-purchased by only one educational institution in Israel: a public elementary school. Attempts to equip the students, aged 6-12, with spaceborne research skills are already underway. The grasp of concepts such as forces, aerodynamics, coordinate systems, and energy conversion is required for the well-rounded spaceborne researcher. Knowledge of Kepler's laws, the six orbital elements, the classification of orbits, and the repercussions of spaceweather on Earth-orbiting bodies is also essential. This paper will discuss the considerations made by the team of tenured STEM/non-STEM teachers, when developing and implementing the two-months-long orbital mechanics unit. Also reviewed will be the Math and Geometry unit baseline, on and off-line resources, worksheet exercises, hands-on activities, and cross-disciplinary concepts that benefit the investigation of orbital mechanics in a public elementary school environment. Lessons and conclusions will be shared.