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## A BALLOON BASED LAUNCH SYSTEM FOR MICRO/NANO/PICO-SATELLITES

**Abstract**

More than 55 years have passed since the first man-made object was launched to space on board a rocket. Space systems and satellites have become drastically smaller since then. We are currently talking about micro-, nano- and pico- satellites. Despite this decrease in size, we are still relying on the same strategy to launch them into space, namely on board a rocket. Although this approach is acceptable for many missions due to the high orbital altitude needs, our new small satellites can also be launched to space using simpler methods. By employing such simple methods, we will be able to make space access and satellite launch more cost effective and accessible.

In this paper, a novel concept is proposed for launching small satellites using a two stage approach. The first stage uses a balloon and buoyancy forces to reach a high enough orbit and then the force of the gas in the balloon is used as a cold gas propellant to propel the satellite to a higher altitude. The feasibility of this concept is assessed in this paper and its range of applicability is identified.