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Mitigation - Tools, Techniques and Challenges (4)

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KICKING THE SPACE JUNK HABIT

Abstract

With three successful orbital launches and 24 satellites deployed in its first year of commercial operations, Rocket Lab is liberating the small satellite market and providing unprecedented access to space. The long-awaited era of dedicated small satellite launches is now here, but it comes with new challenges and responsibilities. The orbital environment is a limited resource, and with high volume launch now a reality, launch providers have an obligation to tackle the growing problem of orbital debris and find solutions to the sustainable management of space.

Rocket Lab is kicking the space junk habit with the nimble but powerful extra stage on Electron, aptly named the Kick Stage. The Kick Stage reimagines the traditional method of using the second stage to circularize the orbit. Instead of leaving large stages in orbit, which can take many years to decay and reenter, Electron leaves its second stage in a highly elliptical orbit to speed up its reentry, while the smaller Kick Stage circularizes the payload orbit. The Kick Stage is designed to employ a cold gas reaction control system to deliver small satellites to precise orbits, before reigniting its 3D printed Curie engine to perform a deorbit maneuver to leave no part of the rocket in space.

Rocket Lab designed this revolutionary system specifically to leave nothing on orbit but the satellites we launch. We're determined to be part of the solution for sustainability and orbital debris reduction in space, and this paper explores the combination of engineering design and business model to make this a reality.