9th SYMPOSIUM ON VISIONS AND STRATEGIES FOR FAR FUTURES (D4)
Space Elevators and Tethers (4)

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SLING ON A RING: MASS- AND MAN-TRANSPORT TO SPACE

Abstract

A Low-Earth-Orbit-based space-elevator system, 'Sling-on-a-RingTM,' is proposed as the crucial developmental stage of the LEO Archipelago. Being a LEO-based heavy-mass lifter, rather than earth- or GEO-based, it is much less massive and therefore less costly than other proposed space-elevators. With the advent of lower-cost, higher-mass transport to orbit, the options for further space development (e.g., space solar power, radiation and space-debris dampers, sun shades, and permanent LEO habitation) are greatly expanded.

This paper provides an update of the Sling-on-a-Ring concept in terms of more details, potential applications, and trade-offs associated with the concept. The impact of Colossal Carbon Tubes, CCT, a new material with high tensile strength, extremely low density, and other favorable properties, is now complemented with low-mass-density compressive structures (Tensegrity-based) needed for the structural integrity and operational safety of the mass lifter.

The ability of lifting man into LEO, in addition to cargo that can survive high-g transitions, is a theme of this paper. The means of 'buffering' a multi-g, multi-minute, transit from 15 to 600 km are explored with this goal in mind. The converse, getting him back by the same route is addressed. This certainly would not be a popular 'tourist route'. However, space workers would be capable of withstanding the transit up. After many weeks or months in LEO, the return trip might be a different case.

The material's and structure's effect on the timeline for the system development indicates the feasibility of near-term implementation of the system (non man-rated, possibly within the decade). The Sling-on-a-Ring can provide a less-expensive, environment-friendly, mode of access to space. This system would pave the way (via eventual operation at ¿1000 tons and hundreds of people per day by 2050) for large scale development of space-based technologies.