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IAF SPACE POWER SYMPOSIUM (C3)
Wireless Power Transmission Technologies and Application (2)

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ADVANCED SPACE-TO-SPACE WIRELESS POWER TRANSMISSION SYSTEM VIA LASER

Abstract

As the space sector is striving towards more flexible and efficient solutions, power supply of space systems constitutes a crucial bottleneck. Indeed, the ever-growing spacecraft's power demand represents a limiting constraint in the development of lighter and flexible spacecraft. For this reason, great efforts are being made in the search for a possible solution for in-space wireless power transmission between satellites, as to propose a sustainable alternative to the current state of the art, overcoming the aforementioned limitations.

The selected technology for the power transfer in this paper is that of lasers, which are excellent candidates for this type of applications thanks to their high-power density compared to other solutions. This technology is thought to be mounted on a constellation of satellites that will support future space missions in Low Earth Orbit through wireless power supply, thus reducing drastically the production costs of the satellites and promoting the development of small space companies.

From the point of view of in-space wireless charging, the control of the laser represents a cornerstone for the success of this type of mission. The focus of this work has been to present an overview of the laser technology, followed by an analysis of the beam propagation and efficiency. Furthermore, that of investigating the alternatives for the pointing mechanisms of the laser, together with the methods of acquisition and tracking in order to establish the link and maintaining it during the totality of the recharging phase.