

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
New Technologies, Processes and Operating Modes Enabling Future Human Missions (7)

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NOVEL CONCEPT DESCRIPTION FOR ISS RE-USE - MEDIUM EARTH ORBIT TETHER LIFT
INTERMEDIATE DEMONSTRATOR

Abstract

This paper will report on a novel concept description for a possible future use of ISS elements for an intermediate space lift demonstrator to allow lifting payloads from 65-100 km sub-orbital altitudes with ISS elements transformed into a lifting station with adequate tether systems encompassing dedicated re-boost, attitude control, hoisting, reeling, and counter-mass subsystems.

We would like to present some basic investigation and preliminary findings for this application. This study on a MEO tether concept could allow - with acceptable sub-orbital velocity rendez-vous requirements - to perform hoisting and lifting of small payloads with the ground support of advanced sub-orbital vehicles. Such study could be an interesting educational project at the Swiss Space Center elaborated with ESA support.

The future disposition of the ISS facility involves partners from United States, Canada, Europe, Japan and Russia - it is today the largest international project and its future is completely open in the post 2020 time period. ISS infrastructure represents about 400 tons of space infrastructure that could be disposed for future projects.

It was proposed to redeploy the ISS instead of performing a controlled re-entry burn (to disassemble the ISS for safety reason would be costly). The possible perspectives for the future use of ISS include today - with radiation protective shielding - the partial move of ISS to GEO or Moon-Earth Lagrangian point L1 with ion propulsion or classical propulsion (to transport habited modules to the moon, or to a lunar orbit).

This proposed option for an intermediate tether lift demonstrator in MEO could permit to perform a first large gradient tether experiment using Earth electro-dynamic thrust. The foreseen application using the Keplerian behaviour of a MEO Center of Mass tether would be an additional option to reduce the future cost of LEO and MEO access and could be further discussed for other applications with dedicated advanced feasibility studies.