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EVALUATION OF THE EFFECT OF CURRENT THROUGH CABLE ON TEMPERATURE AND  
DYNAMICS OF SPACE ELEVATOR

**Abstract**

The understanding of the cable dynamics is one of the most important elements for space elevator design. The modeling of space-elevator cable-dynamics have been attempting in some groups. Our group also has been developing a cable dynamics model [1] by using the lumped-mass model including the effect of the variation of cable temperature with change in sunlight because the variation of cable temperature causes cable expansion and contraction and produces Coriolis force. The cable temperature also will be changed by the resistance heating if the current flows through cable, and cable current effects on cable dynamics because the Lorentz force will be produced by the interaction between the cable current and the geomagnetic field. In this study, we include the effect of cable current in our cable dynamics model, and evaluate its effect. The cable current is estimated by the collected current using the OML ( Orbital Motion Limited) theory and the maximum current limited by resistance for each segment of the cable model. The result shows that the effect on the cable temperature and the dynamics for the total system is small, but there is notable different of local temperature and the cable position at the low altitude. The detail will be shown in the conference.

[1] Otsuka, K., Ishikawa, Y., Yamagiwa, Y., Yamaguchi, K. and Komura, S., Space elevator cable's oscillation caused in space thermal environment, Acta Astronautica, Vol.177, pp,446-456, 2020.