WIRELESS POWER TRANSFER SYSTEM FOR LUNAR AND PLANETARY EXPLORATION

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Summary: Nikola Tesla designed a wireless power transmitter that induces electrical resonance in a planet that may be tapped for power across the planet. The application to the Moon is described herein.

Introduction: A Nikola Tesla Lunar Power Magnifying Transmitter System, LMTS, would use human-made lightning to electrify and resonate the Moon sending power across the planet, wirelessly, to rovers, explorers, landers, and settlements. Tesla claimed that the resonant frequency has to be a 1/4-wave multiple of the planet diameter to obtain a standing wave of energy across the planet [1,2]. He described this for Earth, but the Moon is also reported to have a highly-conductive mantle to carry the power. Further testing of the mantle is planned to occur in 2024 with the Lunar Magnetotelluric Sounder, LMS, as part of the NASA Commercial Lunar Payload Service, CLPS. LMTS may also be useful on other planets and moons. Some comparison between the Earth and the Moon is provided, as well as illustrations of a lightning-bolt waveform resonating on the Moon at 235.55 Hz, creating a standing wave of energy available at geographically dispersed areas.

Approach: Tesla provided multiple patents describing resonating the Earth with electrical power. He gave an explicit requirement for the resonance. Tesla completed his transmitter at Wardenclyffe tower in the early 1900's, and this lunar version uses that work as a basis. We can mathematically create the conditions he expected.

Results: An LMTS would be installed on the Moon and powered by a solar power plant **(Fig. 1)**. It launches a tuned lightning bolt into the moon, creating a standing wave, where power may be tapped **(Fig. 2)** at the standing wave peaks on the surface.

Discussion: To the extent that Nikola Tesla was correct in his wireless transmission of energy, this technology should duplicate the effectiveness of his work, since it uses the theory and designs from his patents. It allows power to be rapidly disseminated around a planet or moon while more extensive infrastructure is developed.

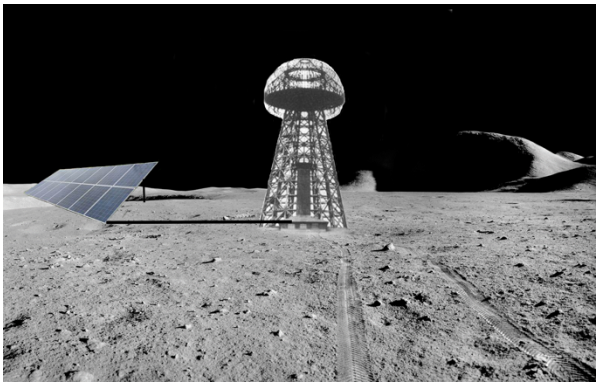

Figure 1. Magnifying transmitter on Moon. *Once the initial power transmitter is operating on the moon, power may be tapped at resonance points across the moon.*

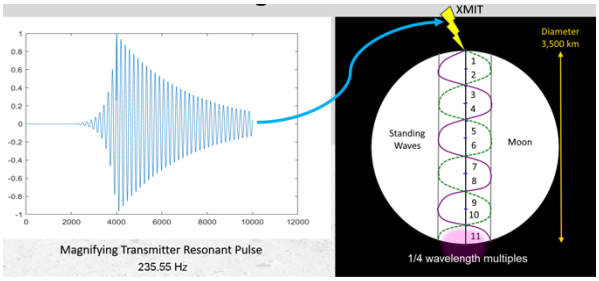

Figure 2. Lunar standing wave. *Resonant frequencies are calculated for the Moon and applied to cause standing-wave 'anti-nodes' through the Moon. The power may be tapped on the surface.*

Conclusion: To the extent that Tesla was correct, the Moon should perform similarly to the Earth, because it reportedly has a similarly-conductive mantle. LMTS could speed exploration by providing power to remote locations.

Future Work: Review the results of the CLPS LMS mission. Create a 3D, physics-based simulation of the lunar standing wave to investigate lunar rover inductive coupling.

Acknowledgments: Gravitronics provided time and resources to perform the initial research.

References: [1] Tesla N. (1905) US Patent 787,412: Art of Transmitting Electrical Energy Through the Natural Mediums; [2] Tesla N. (1914) US Patent 1,119,732: Apparatus for Transmitting Electrical Energy.