

The Science of Nikola Tesla

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Tesla is a name that for anybody in the discipline of physics, electronics or engineering cannot forget. Like Alexander Volta, a unit of measure was made in his name for magnetic flux density, the Tesla. He was a Serbian in origin and he suffered many mishaps and illnesses. A pioneer in Physics and Electrical engineering, he was a proponent of alternating poly phase electric current for the long distance transmission of electrical power.

He was most knowledgeable of the properties of alternating current and its physics. An important property of this current is its ability to radiate electromagnetic energy into space. This makes induction motors and transformers possible with the laws Coulomb and Faraday. These discoveries were in the 1890s. Understanding the radiation properties of the alternating current, he invented a primitive kind of radio for telecommunications. He had a patent dispute with Marconi for radiotelegraphy.

For what I am critical of, is the use of the radiation property of alternating current or for that matter the use of electromagnetic waves to transmit large amounts of power over large distances which he was a proponent of. Let's imagine for a minute if this application turned out to be practical. You would be able to send power without the need for physical infrastructure of wiring and transmission lines. You might be able to have motorized vehicles that draw from this source of energy. It would be revolutionary and create new technologies. But, it would create legal and philosophic problems.

The major reason this is not practical is for Coulomb's Law, for radiation that is omnidirectional, the radiation intensity drops with the inverse square of the distance. For each doubling of the distance, the radiation intensity drops to a quarter of its value. This applies for all kinds of radiation, visible, radio, ultraviolet and x-rays, etc. I don't understand why he got off on such a tangent - he was such a brilliant man!

With the radio spectrum, frequencies below 10 kilohertz are usually not suitable for radio communication, the transmission efficiency drops off very quickly because of the ionized layers of the earth's atmosphere diffracts and reflects the lower radio frequencies and the earth's water bodies and land adsorb and reflect this energy. However there are a few resonances below 10 kilohertz that can be used that are natural electrical resonances. The Schumann resonance is one of them. It is at eight hertz. If one wanted to transmit power by radiation, this would be the frequency to use; you would use the earth as a tank circuit. To have a chance for efficient transmission the aerial would have to be very long. For a quarter wave antenna it would have to be 5,812 miles long. Thinking about it, doesn't this defeat the purpose of wireless transmission of power?

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