Wireless Power Transfer Technologies via Radio Waves

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Wireless power transfer (WPT) is a hopeful technology based on electromagnetic theory and radio wave theory, representing the combined application of electrical and radio science. Numerous WPT technologies exist, such as inductive coupling WPT and resonant coupling WPT as short distance WPT. In addition, WPT via radio waves has been developed as a long distance WPT technology which includes focused beam microwave power transfer (MPT) and energy harvesting from broadcasted radio waves or diffused wireless power. All WPT technologies are based on Maxwell's equations. However, there are minor differences in their applications. WPT via radio waves requires higher frequencies such as microwaves to focus the wireless power effectively. Commercialization scenario of the WPT via radio waves will soon be a reality. WPT via radio waves is, in fact, a valuable and convenient technology that can be used to charge batteries in mobile phones, notebook PCs, electric vehicles (EVs), as well as battery storage for light emitting diodes (LEDs), integrated circuits (ICs), and other equipment. In the near future, stable CO_2-free electric power from space, called Solar Power Satellite (SPS) will be possible using WPT technology. We, Kyoto University, propose various WPT applications and carry out experiments. In my talk, I review the commercialization status of the WPT in the world and show experimental results of the WPT via radio waves in Kyoto University.