2017 New Faculty Research Seminar Series

Quasi-Wireless Capacitive Power Transfer and Its Applications

Presented by Charles Van Neste, Ph.D.

Abstract: Wireless capacitive power transfer is a growing research area that mainly focuses on non-radiating electric-field coupling. It has the potential to be highly efficient, low cost, and less susceptible to alignment issues than competing wireless technologies. One major challenge hindering its widespread use is the high voltages found between the capacitive electrodes. Due to this, bipolar (dual, plus/minus electrode) systems are predominant in literature, as unipolar (one electrode) systems generally require even higher electrode voltages for operation. In this seminar, a new technique will be presented that makes use of quarter wave resonators to reduce electrode voltages while maintaining efficient energy transfer in a unipolar capacitive geometry. This achieves power transmission over conducting surfaces without a return wire, opening an array of possibilities previously unobtainable. The theory of operation will be discussed with an overview of where the technology is, where it may be going, and what kind of problems it could solve.

About the Speaker: Charles Van Neste is a research assistant professor working in the Center for Energy Systems Research at Tennessee Tech University. He obtained his Ph.D. in Electrical Engineering from Tech in 2009, followed by a post-doctoral fellowship at Oak Ridge National Laboratory. In 2011, he accepted a position to lead an energy research program as part of a Canada Excellence Research Chairs Grant in the department of Chemical and Materials Engineering at the University of Alberta, Canada. There he invented a new form of unipolar capacitive power transfer that he is presently applying over a broad range of research areas and applications. He currently holds 11 fully granted patents with three patents pending, 17 journal publications, eight conference proceedings and one book chapter. His primary research interests involve alternative forms of energy generation and transmission with a major focus in wireless and quasi-wireless power transfer, high frequency inverter design, electronic instrumentation, and electromagnetic interactions.

Tuesday, Nov. 7, 2017, 4:30 to 5:30 p.m.
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