PREDICTING CAPACITOR RELIABILITY IN A MODULE-INTEGRATED PHOTOVOLTAIC INVERTER USING STRESS FACTORS FROM AN ENVIRONMENTAL USAGE MODEL

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Abstract
In order for photovoltaic energy to achieve grid parity, the levelized cost of energy (the total lifetime cost) must be reduced. This is not possible by addressing only the solar cells since the inverter is a critical weak link in the system. It is well known that aluminum electrolytic capacitors, ubiquitous in power electronic converters, have end-of-life and failure modes that are sensitive to environmental conditions including temperature. In an ACPV system the inverter is mounted on the photovoltaic (PV) module which exposes the capacitors to potentially elevated temperatures which can increase their failure rate. Existing techniques of derating the capacitors increase the cost of the inverter, so they must be applied judiciously. This talk will present a technique to more accurately compute the MTBF of the capacitors used in a PV inverter by utilizing a thermal model of the PV module to predict operating temperature.

Biography
Mrs. Castillo received her B.S. degree in Electrical Engineering from Southern Methodist University in 2007. She is currently pursuing her M.S. degree in Electrical Engineering and performing research on the topic of reliability of solar panel inverters at the component and system level under the guidance of Dr. Robert Balog and Dr. Prasad Enjeti.