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*Electrical & Computer Engineering*  
**S E M I N A R**  
Louisiana State University

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## **High-Power Medium-Voltage Multilevel Inverters**

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**Abstract**—Nowadays, multilevel inverters are considered as the most cost-effective solutions and the state-of-the art power conversion systems in the medium-voltage and high-power applications. These converters are particularly designed to be employed in energy and power conversion areas requiring high efficiency at higher switching frequencies, high power demand, and augmented power quality.

First, general advantages of multilevel inverter in comparison with two-level inverter will be discussed. Afterwards, some of the challenges in existing active neutral point clamp (ANPC) inverter will be addressed. Then, a new configuration of flying capacitor-based multilevel inverter, called dual flying capacitor (DFC) multilevel inverter, will be presented to alleviate existing challenges. The main advantages of the proposed inverter are natural soft switching of line frequency switches, elimination of the transient voltage imbalance between switches connected in series, and better loss distribution between switches. Simulation results and experimental verification of the five-level DFC inverter will be presented to validate the performance of the converter as well as the applied modulation technique. Furthermore, an analytical approach to calculate and investigate the conduction power loss in ANPC inverter will be presented. At the end, other ongoing research projects and future research plan will be briefly discussed.

**Bio**—Arash Khoshkbar Sadigh (S09 M15) received the B.S. and M.S. degrees (both with First Hons.) in electrical engineering from the University of Tabriz, Tabriz, Iran, in 2007 and 2009, respectively, and the Ph.D. degree in electrical engineering from the University of California Irvine, in 2014. He was with Aran Nagsh Ara Consultant Engineering Company, Tabriz, from 2007 to 2010, where he was involved in the design of power transmission and distribution lines. During summer 2012 and 2013, he was an Intern with the RTDS Advanced Technology Laboratory, Southern California Edison. In 2015, he joined Extron Electronics as power electronics design engineer. He is the author or coauthor of more than 60 journal and conference papers and one book chapter with more than 670 citations, and he holds one patent. His research interests include power electronics circuits, multilevel inverters and their applications in power system, power quality and flexible ac transmission system devices. Dr. Khoshkbar Sadigh was selected by the University of Tabriz as the Distinguished Student in 2006. In 2007, he joined the Iran's National Elites Foundation as he ranked second in the National Entrance Exam for graduate study in electrical engineering with a major in power engineering. He was a recipient of an Outstanding Presentation Award from the IEEE Applied Power Electronics Conference and Exposition (APEC) in 2013.

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**Where:** Room 338 ERAD

**Info:** <http://www.lsu.edu/eng/ece/seminar>

