HIGH POWER DUAL ACTIVE BRIDGES DESIGN, MODELING, AND IMPLEMENTATION

Prof. Adel Nasiri,
University of South Carolina (USC), USA

Abstract

Dual Active Bridges (DAB) are common power electronics building blocks traditionally used in various electrically isolated converter systems. There is a renewed interest in understanding and developing DABs as core components for Solid State Transformers (SST). These transformers can add flexibility, controllability, and reliability to existing electrical distribution systems. Major elements of a DAB are two H-bridge converters and a high frequency transformer. With the advent of Wide Band Gap (WBP) devices offering higher voltage and power ratings, many initiatives have started to replace the traditional low frequency transformers with compact and controllable SSTs. In this tutorial, first the design and development of high frequency transformers are discussed. Then, several control methods for the DABs including phase-shift, duty ratio, and triple phase shifts are discussed to control the power flow. Methods are discussed to minimize the RMS current, reduce reactive power transfer, and minimize converter loss. Applications of DABs for several SST configurations a are also discussed.,

Prof. Adel Nasiri,
University of South Carolina (USC), USA