New Configurations of Power Converters for Grid Interconnection of Renewable Energy Systems

According the National Energy Strategy proposed by the Chilean Government in March 2012, the growing technological development in Chile has lead to the search of energy efficiency and the penetration of the renewable energies and other generation systems to the electricity supply network. The power converters play an important role for the management of electric energy, providing the interconnection between the generation and the distribution systems. The power converters commonly used today include energy storage elements that add weight, size and failure possibilities. The matrix converters do not have energy storage elements and they are a flexible and efficient alternative to manage energy. These converters have been considered in specific applications such as military, aerospace, wind generation systems among others. However, they have not been deeply studied in applications for grid interconnection of generation systems and/or loads. It is expected that their features: 1) compact and simple power circuit without energy storage elements; 2) bidirectional flow capacity; 3) generation of high quality voltages with arbitrary amplitude and frequency; 4) sinusoidal currents generation; 5) operation possibilities with unitary displacement power factor, allow for more robust systems, with smaller size and better performance than traditional configurations. The main objective of this presentation is to propose power converter configurations to allow the grid interconnection of different types of generation systems and/or loads with a cheap, clean and sustainable transmission and distribution structure for the country

Marco Rivera (S'09–M'11) was born in Talca, Chile, in 1982. He received the B.Sc. degree in electronics engineering and the M.Sc. degree in electrical engineering from the Universidad de Concepción, Concepción, Chile, in 2007 and 2008, respectively, and the Ph.D. degree from the Department of Electronics Engineering, Universidad Técnica Federico Santa María, Valparaíso, Chile, in 2011.

Since 2013, he has been with the Energy Conversion and Power Electronics Research Group, the Universidad de Talca, Curico, Chile, where he is currently an Associate Professor with the Department of Industrial Technologies. His main research interests include digital control applied to power electronics, matrix converters, predictive control, and control of power converters for renewable energy applications.

Prof. Rivera received the Best Ph.D. Thesis Award 2012 from the Chilean Academy of Science for a Ph.D. thesis developed in 2011 by national and foreign students in any exact or natural sciences program in Chile. In August 2015, he received the Outstanding Engineer 2015 Award of the Electrical–Electronics Industry Association and the IEEE Chile Section, and, he also received the 2015 Second Prize Paper Award from the IEEE JOURNAL OF EMERGING AND SELECTED TOPICS IN POWER ELECTRONICS.

Prof.-Dr. Marco Rivera Abarca
Associate Professor
Universidad de Talca
Department of Industrial Technologies
E-mail: marcoriv@utalca.cl / marcoesteban@gmail.com
Telephone: +56-75-2201795
Skype: marco.rivera.abarca/esteban1429