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## "PREDICTIVE CONTROL IN POWER ELECTRONICS AND ELECTRICAL DRIVES"

**Prof. dr Marco Esteban Rivera Abarca**

**Profesor Asociado, Escuela de Ingeniería Civil Eléctrica, Facultad de Ingeniería**

**Universidad de Talca**

**Abstract** – With the fast microcontrollers available today, applications of predictive control in power converters and electrical drives are a very powerful and attractive alternative to classical controllers. The use of predictive control offers a number of advantages: very intuitive approach, no need for linear controllers and modulators, easy inclusion of nonlinearities and restrictions, etc. However, predictive control schemes in power converters and electrical drives have not yet been implemented in industrial applications. Nevertheless, after some further progress, it can be expected that the advantages of predictive algorithms will lead to an increased number of industrial applications in the future. This tutorial will present the most recent advances with topics such as the following:

- Predictive control applied to power converters: AC/DC, AC/AC, DC/AC, AC/DC/AC, multilevel converters, etc.
- Predictive control applied to motor drives: induction machines, permanent magnet synchronous motors, etc.
- Design and implementation issues of predictive control: cost function selection, weighting factor design, delay compensation, model parameters errors, variable switching frequency, etc.
- Applications of predictive control in Industrial Electronics.



### **Author's Biography**

{**Marco Rivera**} (S'09-M'11-SM'2017) received his B.Sc. in Electronics Engineering and M.Sc. in Electrical Engineering from the Universidad de Concepcion, Chile, in 2007 and 2008, respectively. He received his PhD degree from the Department of Electronics Engineering, Universidad Tecnica Federico Santa Maria, in Valparaiso, Chile, in 2011 with a scholarship from the Chilean Research Fund CONICYT. During 2011 and 2012, Prof. Rivera held a Post Doctoral position and worked as part-time professor of Digital Signal Processors and Industrial Electronics at Universidad Tecnica Federico Santa Maria.

Currently he is an Associate Professor in the Faculty of Engineering at Universidad de Talca, Curic'?, Chile.

Prof. Rivera Abarca was awarded a scholarship from the Marie Curie Host Fellowships for early stage research training in electrical energy conversion and conditioning technology at the University College Cork, Cork, Ireland in 2008. In 2012, Prof. Rivera was awarded the Chilean Academy of Science Doctoral Thesis Award (Premio Tesis de Doctorado Academia Chilena de Ciencias), for the best PhD thesis published in 2011, selected from among all national and international students enrolled in any exact or natural sciences program in Chile and also he was awarded as an Outstanding Engineer in 2015.

His research interests include matrix converters, predictive and digital controls for high-power drives, four-leg converters, renewable energies and development of high performance control platforms based on Field-Programmable Gate Arrays having almost 300 publications in journal and international conferences. Currently Prof. Rivera is member of the advisory council of the civil society for the ministry of energy.