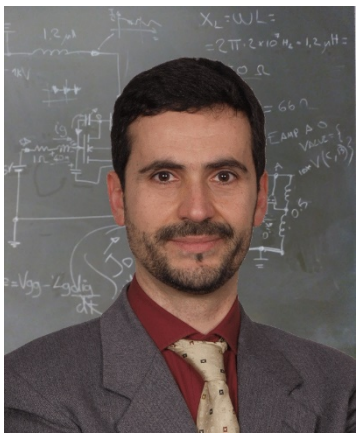
Mission-profile-based power application design for reliability

Prof. Francesco Iannuzzo, Aalborg University, Denmark



Francesco Iannuzzo (MIEEE ’04, SMIEEE ’12) received the M.Sc. degree in Electronic Engineering and the Ph.D. degree in Electronic and Information Engineering from the University of Naples, Italy, in 1997 and 2001, respectively. His PhD thesis was about instabilities of MOSFETs during diode operations.

From 2000 to 2006, he has been a Researcher with the University of Cassino, Italy, where he became Aggregate Professor in 2006 and he is currently Associate Professor since 2012. In 2014 he got a contract as professor in Reliable Power Electronics at the Aalborg University, Denmark, where he is also management committee member and work package leader of CORPE (Center of Reliable Power Electronics).

His research interests are in the field of reliability of power devices, including cosmic rays, power device failure modelling and testing of power modules up to MW-scale under extreme conditions, like overvoltage, overcurrent, overtemperature and short circuit. He is author or co-author of more than 120 publications on journals and international conferences and one patent. Besides publication activity, over the past years he has been invited for several technical seminars about reliability in first conferences as EPE, ECCE and APEC.

Prof. Iannuzzo was the Technical Programme Committee co-Chair in two editions of ESREF, the European Symposium on Reliability of Electron devices, Failure physics and analysis, and has been appointed general chair for ESREF 2018 in Aalborg. He has been guest editor for Microelectronics Reliability and permanently serves as peer reviewer for several conferences and journals in the field, like: APEC, ECCE, EPE, ESREF, IECON, Elsevier Microelectronics Reliability, IEEE Transactions on Industrial Electronics and Transactions on Power Electronics.

Abstract

The short course is based on the experience gained over the years at the CORPE (the Center of Reliable Power Electronics), Aalborg University, in terms of design for reliability of power electronic applications, mainly oriented at renewable generation (wind-turbine and photovoltaics).

After a brief introduction to modern reliability challenges, the course presents a mission-profile-based design approach: starting from damage mechanisms, the main stressors are identified and, consequently, a realistic prediction of consumed lifetime can be worked out, also adopting custom software tools. Mitigation strategies at control, modulation and driving level are then discussed.