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ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

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Date	January 15, 2019
Location	MEB 010 / EPFL, CH-1015, Lausanne
Time	11.00 – 12.00h

Protection of Multi-Terminal HVDC Grids

Abstract

High Voltage DC (HVDC) transmission is a long-standing technology with many installations around the world. Over the past few years, significant breakthroughs in the voltage-sourced converter technology have made the HVDC technology even more promising in providing enhanced reliability and functionality and reducing cost and power losses. Concomitantly, significant changes in generation, transmission, and loads such as (i) integration and tapping renewable energy generation in remote areas, (ii) need for relocation or bypassing older conventional and/or nuclear power plants, (iii) increasing transmission capacity, and (iv) urbanization and the need to feed the large cities have emerged. These new trends have called for Multi-Terminal DC (MTDC) systems, which when embedded inside the AC grid, can enhance stability, reliability, and efficiency of the present power grid. The strategic importance of MTDC grids is evidenced by the number of worldwide projects currently in their advanced planning stage, e.g., European "Supergrids" and the Baltic Sea project along with a few projects in China and USA.

Amid the optimism surrounding the benefits of MTDC grids, their protection against DC-side faults remains one of their major technical challenges. MTDC grid protection is far more difficult than AC grids as DC fault phenomenon is more complex. The protection philosophy of the MTDC grids, nevertheless, is similar to the AC counterparts in the sense that both primary and backup protection schemes are required. Upon occurrence of a DC fault, the recently emerged hybrid DC circuit breakers (CBs) need to selectively and quickly isolate any faulty line without interrupting the entire system. However, incorporating such DC CBs into the MTDC grid adds another level of complexity as the DC short circuit current increases with commensurate increase in transient overvoltage. This presentation is focused on addressing the aforementioned challenges associated with several protection aspects of the MTDC grids. At the end, an overview of the speaker's current research activities on utility-scale power electronics based on emerging wide-band-gap semiconductor devices will be also presented.

The lecture is open to the public. The event takes place within the scope of the Swiss Chapter of IEEE Power Electronics Society, **https://www.ieee.ch/chapters/pel/**

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Biography

Maryam Saeedifard received the Ph.D. degree in electrical engineering from the University of Toronto, in 2008. Since January 2014, she has been with the School of Electrical and Computer Engineering at Georgia Institute of Technology, where she is currently as associate professor. Prior to joining Georgia Tech, she worked as an assistant professor at Purdue University and a research scientist with the Power Electronic Systems Group, ABB Corporate Research Center, Switzerland. She is the recipient of the J. David Irwin Early Career Award of the IEEE Industrial Electronic Society in 2018, Richard M. Bass Award Outstanding Young Power Electronic Engineer Award of the IEEE Power Electronic Society in 2010, and Excellence in Research from of the Office of Vice President for Research of Purdue University in 2011 and 2012. She has received two best Trans. paper awards from the IEEE Trans. on industrial Electronics in 2016 and 2018. She was an invited speaker to the U.S. National Academy of Engineering, Frontiers in Engineering Symposium in 2011. She is currently serving as an associate editor for the IEEE Trans. on Power Electronics, Trans. on Industrial Electronics, Trans. on Smart Grid and Journal of Emerging and Selected Topics in Power Electronics. Her research interests are power electronics, medium- and high-power energy conversion systems, power electronic systems based on wide-band-gap switching devices, HVDC transmission systems, and protection and control of MTDC grids.

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