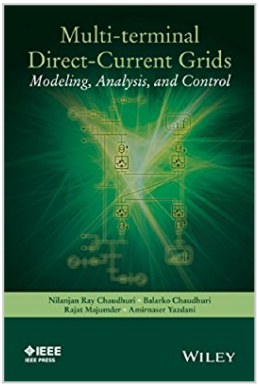

Multi-terminal Direct-Current Grids: Modeling, Analysis, and Control (Wiley - IEEE)

By Nilanjan Chaudhuri, Balarko Chaudhuri, Rajat Majumder, Amirnaser Yazdani

Multi-terminal Direct-Current Grids: Modeling, Analysis, and Control (Wiley - IEEE) By Nilanjan Chaudhuri, Balarko Chaudhuri, Rajat Majumder, Amirnaser Yazdani

A generic DC grid model that is compatible with the standard AC system stability model is presented and used to analyse the interaction between the DC grid and the host AC systems.

A multi-terminal DC (MTDC) grid interconnecting multiple AC systems and offshore energy sources (e.g. wind farms) across the nations and continents would allow effective sharing of intermittent renewable resources and open market operation for secure and cost-effective supply of electricity. However, such DC grids are unprecedented with no operational experience. Despite lots of discussions and specific visions for setting up such MTDC grids particularly in Europe, none has yet been realized in practice due to two major technical barriers:

- Lack of proper understanding about the interaction between a MTDC grid and the surrounding AC systems.
- Commercial unavailability of efficient DC side fault current interruption technology for conventional voltage sourced converter systems

This book addresses the first issue in details by presenting a comprehensive modeling, analysis and control design framework. Possible methodologies for autonomous power sharing and exchange of frequency support across a MTDC grid and their impact on overall stability is covered. An overview of the state-of-the-art, challenges and on-going research and development initiatives for DC side fault current interruption is also presented.

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From the Back Cover

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About the Author

Nilanjan Ray Chaudhuri received his Ph.D. degree from Imperial College London, UK. His research interests include power system dynamics and control, application of power electronics in power systems, online system identification, FACTS, HVDC, and renewable energy systems. He serves as an Associate Editor of the IEEE Transactions on Power Delivery. Nilanjan is a member of the WECC's HVDC modeling Task Force, multiple CIGRE' subcommittees, a member of the IEEE, IEEE PES, CIGRE' and Sigma Xi.

Balarko Chaudhuri is a Senior Lecturer in the department of Electrical and Electronic Engineering at Imperial College London, UK. His areas of expertise include electric power transmission systems, control theory, smart grids and renewable energy. He is an associate editor of the IEEE Systems Journal and Elsevier Control Engineering Practice. He is a Senior Member of the IEEE.

Rajat Majumder did his PhD in Power Systems at Imperial College London, UK. He specializes in power system analysis, modeling and control design, with special emphasis on dynamic stability issues in large interconnected power grids involving HVDC and FACTS. He is serving as an editorial board member of Institute of Engineering Technology's (IET) Proceedings of Generation, Transmission and Distribution. He is a Senior Member of the IEEE.

Amirnaser Yazdani is an Associate Professor with Ryerson University in Toronto, Canada. From 2006 to

2011, he was an Assistant Professor with the University of Western Ontario in London, Canada, and prior to that he was with Digital Predictive Systems (DPS) Inc., Mississauga, Canada, active in the design and production of power converters for wind energy systems. Dr. Yazdani has extensive industry and academic experience in design, modeling, and analysis of switching power converters and railway signaling systems, and has served as an Associate Editor of the IEEE Transactions on Power Delivery. He is a Senior Member of the IEEE, a Professional Engineer in the Province of Ontario, Canada, and a co-author of the book Voltage-Sourced Converters in Power Systems, published by IEEE/Wiley Press, 2010.

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