

Enhanced Model Predictive Control for Multilevel Converters

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Speaker:

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Abstract:

Multilevel Converters (MLCs) are the first option for efficient and high power quality requirements of power systems. MLC supports the high power and medium voltage devices in most of advanced smart grid applications thanks to its higher reliability and longer lifetime. Recently, Model Predictive Control (MPC) is preferred over other conventional controllers due to matching the nature of power electronic converters along with its superiority in performance. MPC depends on the model complexity, which considered one of the obstacles to be used with MLCs applications that have complex models. In this seminar, advanced approaches for MPC applied to MLCs will be presented. The proposed approaches substantially reduce the computational burden and programming complexity; the matter that make MPC is very useful for complex MLC applications. In addition, the proposed control strategy mitigates the weighting factors tuning problem of capacitor balancing in addition to the conventional MPC cost function. Hardware experimental setup for a five level MLC is built, tested, and verified in KFUPM laboratories using the proposed MPC approaches. The experimental results show that the proposed approaches are promising and can be applied to many applications in smart grids.

Bio:

Dr. Aboubakr Salem received the B.Sc. and M.Sc. degrees in electrical engineering from Helwan University, Egypt, in 2004 and 2009, respectively. He received his PhD from Ghent University, Belgium in 2015. He is currently working as Visiting Assistant Professor at EE Dept., King Fahd University for Petroleum and Minerals. He is involved in several funded projects from KFUPM as PI and Co-I. He has participated as a Co-I in funded projects from European Union (i.e. STS-Med and Euro-Sun-Med) with a fund of € 20 million. His research interests include power electronic converters design and control, electrical drives applications, renewable energy integration, electrical vehicles and smart grid applications.