Generalized Dynamic Phasor Based Simulations for Power Systems

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Wide-spread usage of power electronics has enabled the power systems industry to increase the efficiency of modern power systems [1] as well as incorporate new forms of clean energy generation. For example, the Nelson River dc transmission system allows Manitoba Hydro to efficiently transmit clean hydroelectric energy generated in northern Manitoba to the main population centres in the southern parts of the province [2]. However, power electronic converters and devices contribute to the harmonics present in power systems [3]. Therefore, modern simulation techniques must address the increasing presence of harmonics produced by power electronic devices. The purpose of this project is to investigate the use of dynamic phasors to create a generalized, multi-purpose simulator. The simulator will be capable of carrying out simulations on a user defined system using the desired number of harmonics. Simulations have been carried out for general linear systems and a phase-locked loop model has been developed for testing with the linear circuit simulator. Future work includes adding nonlinear models, such as HVDC converters and synchronous machines, as well as additional control system components.

References

