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Modelling of a triple active bridge converter for a current pulsation compensatory application

Abstract:

The energy storage operating with a three-phase four wire inverter is exposed to current pulsating with the doubled frequency of the grid. This effect is especially noticeable when the inverter works with deep phase current asymmetry. The negative effect of pulsating current on the lithium-ion battery is constantly debated. It is reasonable, to apply a protection circuit to the battery, to reduce the impact of the AC component of the pulsating current. In order to protect the battery, a triple active bridge (TAB) converter can be utilized. The paper presents modelling of such a converter for active separation of AC and DC components of the DC link current. The AC component is directed to a supercapacitor, while the DC component flows to the energy storage. Presented modelling approach utilizes Fourier series approximation to model the internal dynamics of the converter. The model can be further used to develop closed control loop and decoupling mechanism between multiple outputs of the converter.

Keywords:

Triple Active Bridge, converter modelling, non-linear state space model