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Control strategies for brushless doubly fed reluctance machines

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Abstract:

Brushless doubly-fed machines (BDFMs) have been extensively researched over the last 15 years because they allow the use of a partially rated inverter in many variable speed applications. In its cage form the machine has substantial rotor losses and compromised efficiency. However, a reluctance version of the BDFM, the brushless doubly-fed reluctance machine (BDFRM), ideally has no rotor losses and therefore offers the potential for greater efficiency and much simpler control. To date a truly comprehensive and machine independent theoretical analysis of the BDFRM's optimal control properties has not been carried out. This paper will attempt to fill this void by considering the theoretical performance limitations of various control strategies for the machine, including maximum torque per inverter ampere, maximum torque per total ampere, maximum power factor of the two windings and associated trade-offs.

Keywords: brushless, reluctance machines, optimal control