

Temperature-dependent demagnetization nonlinear Wiener model with neural network for PM synchronous machines in electric vehicle

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Abstract

The inevitable temperature raise leads to the demagnetization of permanent magnet synchronous motor (PMSM), that is undesirable in the application of electrical vehicle. This paper presents a nonlinear demagnetization model taking into account temperature with the Wiener structure and neural network characteristics. The remanence and intrinsic coercivity are chosen as intermediate variables, thus the relationship between motor temperature and maximal permanent magnet flux is described by the proposed neural Wiener model. Simulation and experimental results demonstrate the precision of temperature dependent demagnetization model. This work makes the basis of temperature compensation for the output torque from PMSM.

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