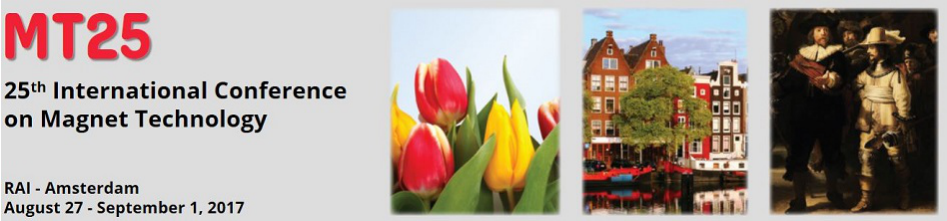

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Electromagnetic Analysis on Dual-Stator Switched Reluctance Motor

Monday 28 August 2017 13:15 (1h 45m)

The dual-stator switched reluctance motor (SRM) is based on the traditional SRM and increases one electrical port with two stators and a rotor. The outer-stator adopts salient pole structure of 12 poles, the inner-stator adopts 6 poles, the middle-rotor is doubly salient with 8 poles. The outer-stator and inner-stator have concentrated windings. That is to say, the outer motor is three-phase 12/8 structure machine, and the inner motor is three-phase 6/8 structure machine. Different inner-stator pole-arc, coefficient, different outer-stator pole-arc coefficient, different rotor teeth pole-arc coefficient, different rotor yoke thickness, different outer-stator yoke thickness, different inner-stator yoke thickness are analyzed for enhancing the average electromagnetic torque. The rotor teeth and the inner-stator pole-arc width are equal in order to avoid that the rotor inner teeth pole-arc width effects the inner stator pole-arc coefficient. The rotor of dual-stator SRM has no windings, the each teeth of the stator has a central coil, and diametrically opposed two coils are connected in series. According to the series in different ways, it can be divided into positive and negative distribution. When the stator windings are energized in one direction, the stator teeth have a pair of NS poles and two pairs of NN poles, and the layouts of windings are different too. According to its positive and negative distribution and different layouts, the motor windings have 12 kinds of layouts. First, when the outer-stator winding layout is NNNNNNNNNNNN, the stator windings can be SSSSSS, SSSNNN, SNSNSN and NNNNNN, four kinds. When the outer-stator winding layout is NNNNNNSSSSSS, the stator windings have SSSSSS, SSSNNN, SNSNSN and NNNNNN, four kinds of distributions. When the outer stator winding layout is NSNSNSNSNSNS, the stator windings have SSSSSS, SSSNNN, SNSNSN and NNNNNN, four kinds of layouts. The NSNSNSNSNSNS with SNSNSN is selected for enhancing the torque by FEM calculation.

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