

Performance assessment of a multi-speed single-phase capacitor motor using a hybrid analytical–FEM methodology

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Abstract:

This paper submits a performance analysis for the multi-speed, single-phase induction motor to calculate its current, power, torque, power factor, and efficiency at various speeds, and to study the effect of any changing in its design like rotor bars skewing and capacitor value on the motor performance. The analysis was done by using a hybrid analytical-finite element analysis methodology based on RMxpert / Maxwell2D. The test motor was modelled by RMxpert according to its design documents with special efforts in modelling of its three-speed separate stator winding. The simulation results of both software were compared with the motor test results taken from the motor manufacturer with a good agreement. The proposed methodology can be adopted successfully for this type of motor to assist the motor designer in studying the effect of changing its design without needing to manufacturing and testing a costly prototype motor.