Abstract

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Operation of a switched reluctance motor from a single-phase AC supply

A conventional switched reluctance motor includes a housing a stator formed by laminating of electromagnetic steel plates and having a plurality of pairs of opposing stator pole portions a rotor formed by laminations of electromagnetic steel plates and having a plurality of pairs of rotor pole portions. The rotor disposed in the stator such that when the rotor rotates, each of the rotor pole portions moves in and out of the alignment with each of the stator pole portions. On each of the stator pole portions, a coil is wound such that the coils which are wound on each of the pairs of opposing stator pole portions are connected in series with each other to form one phase winding. Each phase winding is connected in series with a switching element such as a thyristor to from one branch. All branches are connected in parallel to a single-phase AC supply. Thereby a magnetic flux is generated between each pair of stator pole portions when a current is supplied from the ac supply to the stator coil and repeated many cycles as long as the rate of change of inductance of this stator phase is positive. The number of cycles of phase current depends on the ratio between the rotor speed in radian per second to the angular frequency of the supply voltage in radian per second. A magnetic attractive force occurs between the rotor pole portions and stator pole portions as they approach one another. This magnetic attractive force produces a motoring torque which can be controlled by controlling the switching delay angle of the switching element where the higher the load torque, the lower the speed. This is because, for low speeds, the current repeats many cycles during the positive rate of change of inductance period and consequently the average torque is high while, for high speeds, the current does not repeat many cycles during the positive rate of change of inductance period and consequently the average torque is low.