Induction Motor Parameters Determination for Iron Losses Analysis

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Abstract — Taking into account the equivalent circuit of the induction motor considering the iron losses, its mathematical model was created based on the state equations in the stationary d-q frame, assuming that the magnetizing dynamic inductance is equal to the static one, which depends on the magnetizing current. After obtaining the state equations, containing the d-q stator and rotor current components, the SIMULINK model of the induction motor was created. The experimental analysis has been accomplished for different operating frequencies (50Hz, 35Hz, 30Hz and 20Hz), including the idle and short circuit conditions. These tests were conducted to obtain the necessary data for the separation of mechanical losses for the three-phase induction motor, in order to determine the magnetizing inductance and the magnetizing resistance depending on the iron losses. An algorithm for the magnetizing resistance and inductance computation was elaborated. The induction motor parameters were obtained at each static operating point by using the developed algorithm. They were used in the SIMULINK model to calculate the energetic indicators. For each operating point, the energetic analysis based on the proposed algorithm was conducted, after calculating the corresponding magnetizing resistance and inductance. This algorithm that combines the determination of the parameters and the energetic performances of the induction motor is the main contribution of the paper.