

عنوان مقاله:

Classification of Multiple Electromechanical Faults in BLDC Motors Using Neural Networks and Optimization Algorithms

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خلاصه مقاله:

Fault detection and classification of brushless DC motors (BLDCM) is considered in this paper. A novel solution is introduced to diagnose multiple electromechanical faults that includes the stator inter-turn, the rotor dynamic imbalance, the rotor static imbalance, and different combinations of them. The current signal of the BLDCM is used together with the motor torque and the motor speed to achieve the classification of a wide range of defects. The fault features of the measured signals are extracted using packet wavelet transform (PWT). These features which include the energy, in the two modes of BLDCM operation: without load and with load, are used as input data for the radial basis function (RBF) neural network. Therefore, the designed algorithm maintains its efficiency in all operating conditions of the BLDCM. Besides, by the combination of the mentioned algorithms, the relationship between the fault types and different affected parameters of the measured signals are obtained more precisely. The neural network weights are updated by the particle swarm optimization (PSO) and the genetic algorithm (GA) that improve the convergence speed and provide better flexibility for local problems. Finally, the effectiveness of the proposed methods is validated by comparing the results obtained for different combinations of the neural networks and optimization methods.

کلمات کلیدی:

BLDCM, Fault Classification, PWT, RBF, PSO, GA

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