

## **Induction motors broken rotor bars detection using MCSA and neural network: experimental research**

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### **Abstract**

Early detection and diagnosis of incipient faults are desirable to ensure an improved operational effectiveness of induction motors. A novel practical method of detection and classification for broken rotor bars, using motor current signature analysis associated with a neural network technique is developed. The motor-slip is calculated via a new simple and very rigorous formula, based on  $(f_s - f_r)$  mixed eccentricity harmonic. It can be seen from the experimental study, carried out on hundreds of observation, that the mixed eccentricity harmonic  $(f_s - f_r)$  has the largest amplitude in its existence range, under different motor loads and conditions (healthy or defective). Since  $(f_s - f_r)$  is related to the slip and the mechanical rotational frequency, it is obvious that the detection of the broken rotor bars harmonics  $(1 \pm 2k)s f_s$  becomes easy. The amplitude of these harmonics and the slip value (detection and discernment criterion) are used as the neural network inputs. The neural network provides a reliable decision on the machine condition. The experimental results obtained from 1.1 and 3 kW motors prove the effectiveness of the proposed method.

**Keywords :** Induction motor ; Broken rotor bars ; Diagnosis ; MCSA ; Neural network.

**Link** <http://link.springer.com/article/10.1007%2Fs13198-013-0149-6>