

Arc Voltage Signals-Based Flicker Effect Analysis Using SampEn Multi-scale Entropy Algorithm

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Abstract: Real-time monitoring in the steel and metallurgical production sector is of great importance. To ensure competitiveness, the industrial process will have to innovate and evolve towards better quality. Therefore, the monitoring of the voltage signal in Electric Arc Furnace (EAF) has a vital role in keeping a nominal operation of electrical components in order to achieve high performance. A new monitoring method based on multi-scale Sample Entropy (SampEn) (MSE) algorithm for EAF voltage flicker is proposed. In the proposed method, different percentages of flicker effect analysis are presented. The current voltage characteristic of the EAF in conjunction with MSE and comparison of observed values with those predicted from a Cassie and Mayr model built using nominally healthy data are analysed. In order to achieve the classification procedure, five extracted features are used to adapt the subtractive clustering network for each state of the flicker effect and the performance of the classifier during the training is given with success.

Keywords : Electric Arc Furnace (EAF), Power quality, Voltage flicker, Voltage unbalance, SampEn Multi-scale entropy algorithm, subtractive clustering