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Power Quality Modeling Using Recognition Learning Methods for Waveform Disturbances

Authors : Sang-Keun Moon, Hong-Rok Lim, Jin-O Kim

Abstract : This paper presents a Power Quality (PQ) modeling and filtering processes for the distribution system disturbances using recognition learning methods. Typical PQ waveforms with mathematical applications and gathered field data are applied to the proposed models. The objective of this paper is analyzing PQ data with respect to monitoring, discriminating, and evaluating the waveform of power disturbances to ensure the system preventative system failure protections and complex system problem estimations. Examined signal filtering techniques are used for the field waveform noises and feature extractions. Using extraction and learning classification techniques, the efficiency was verified for the recognition of the PQ disturbances with focusing on interactive modeling methods in this paper. The waveform of selected 8 disturbances is modeled with randomized parameters of IEEE 1159 PQ ranges. The range, parameters, and weights are updated regarding field waveform obtained. Along with voltages, currents have same process to obtain the waveform features as the voltage apart from some of ratings and filters. Changing loads are causing the distortion in the voltage waveform due to the drawing of the different patterns of current variation. In the conclusion, PQ disturbances in the voltage and current waveforms indicate different types of patterns of variations and disturbance, and a modified technique based on the symmetrical components in time domain was proposed in this paper for the PQ disturbances detection and then classification. Our method is based on the fact that obtained waveforms from suggested trigger conditions contain potential information for abnormality detections. The extracted features are sequentially applied to estimation and recognition learning modules for further studies.

Keywords : power quality recognition, PQ modeling, waveform feature extraction, disturbance trigger condition, PQ signal filtering
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