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Research on power quality disturbances classification based on S transform and dynamics

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With the development of power system and wide use of power electronics, power quality becomes poor and poor, which increasingly attracts the attention of people. In order to improve power quality, the efficient and accurate disturbance detection and classification from massive power quality data is necessary for us to realize power quality analysis and control. This paper proposed a real time power quality disturbances classification by using a hybrid method based on S transform and dynamics. Classification accuracy and runtime are mainly concerned. The hybrid method firstly uses dynamics to identify the location of the signal components in the frequency spectrum yielded by Fourier transform, and then uses inverse Fourier transform to only some of the signal components. By the hybrid method, runtime of the application has been greatly reduced with satisfactory classification accuracy. In order to reduce the influence of Heisenberg's uncertainty, we firstly proposed that different signal components are windowed by different Gaussian windows, which brings better adaption and flexibility. Then features from Fourier transform, S transform and dynamics are selected and decision tree is used to classify the types of power quality disturbance. A DSP-FPGA based hardware platform is adopted to test the runtime and correctness of the proposed method under real standard signals. Finally, field signal tests are presented. Both simulations and experiments validate the feasibility of the new method.

Biography

Li Kaicheng has completed his PhD in 1998 from Huazhong University of Science and Technology. He is the Professor of Huazhong University of Science and Technology and mainly focuses on research on electromagnetic measurement, power quality analysis and control, electronic transformer, intelligent instrument, etc. He teaches courses such as signals and systems, sensors and automatic measurement, weak signal detection and so on. He has published more than 100 papers and obtained 10 patents and 5 government awards.

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