An Algorithm for Harmonics/Inter-harmonics Analysis based on Removing Components and Multi-spectrum-line 

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Abstract-Tokamak power system has not only harmonics and a plenty of inter-harmonics between 75Hz and 150Hz. Considering non-synchronous sampling and in non-integral period truncation, the window and interpolation algorithms have been used to improve the accuracy of harmonic parameter computation by FFT. In this paper, a method based on removing components and multi-spectrum-line interpolation is proposed to analyze harmonics and inter-harmonics. The used spectrum lines must be in not only main-lobe but also between adjacent harmonics. We had proved that the phase difference of any two adjacent spectrum lines is $\pi$. According to this rule, this paper has induced a fast algorithm so that modular operation is only calculated one time when we analyze the parameters of one harmonic. Based on the various order’s hamming self-multiplication windows, the simulation and experiment results have shown that the algorithm has high precision and only need one modular operation for one harmonic/inter-harmonic.

Index Terms – Tokamak power supply; harmonic/inter-harmonic analysis; removing components; multi-spectrum-line interpolation

REFERENCES