SKM Power*Tools
ELECTRICAL ENGINEERING SOFTWARE

PTW HI_WAVE

Harmonic Analysis Software

HI_WAVE simulates resonance and harmonic distortion in industrial, commercial, and utility power systems.

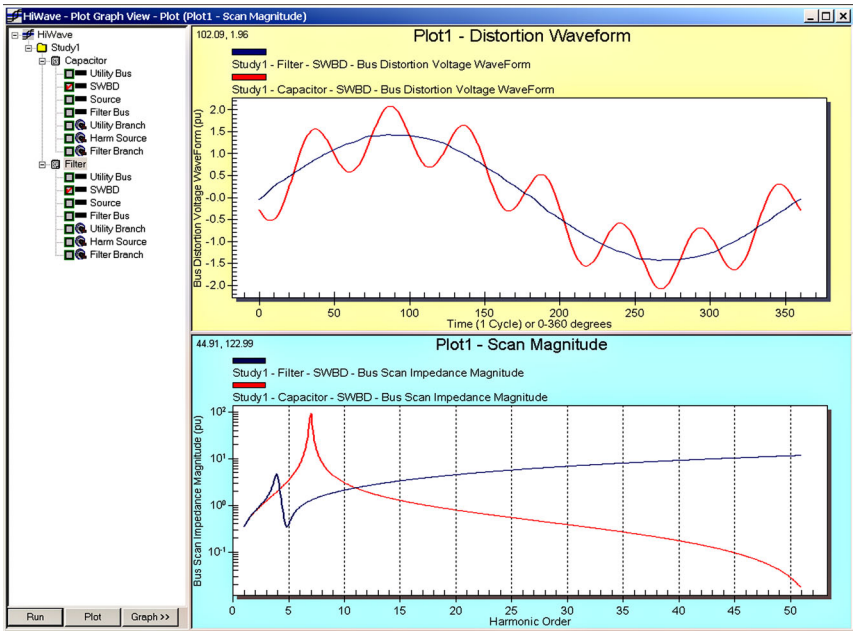
Harmonic current and voltage sources may be defined at multiple locations in the power system. Capacitor banks, single tune filters and high pass filters may be included in the voltage and current distortion evaluation, impedance resonance scans, and in harmonic load flow results.

Any type of system design, with any combination of voltage levels may be evaluated with this highly interactive, user friendly software.

With HI_WAVE, new power systems may be examined before they are built and the harmonic effects addressed during the design. Existing power systems may be studied and corrective filter designs evaluated before they are installed. Every bus and branch in the power system may be quickly evaluated for harmonic content and for resonant impedance characteristics.

Benefits

- Save time and money by trouble-shooting harmonic problems and evaluating alternative solutions quickly.
- Improve power system reliability by identifying potential resonance conditions and minimizing harmonic distortion.
- Minimize I^2R heating losses and increase equipment life.
- Save money and improve designs by predicting resonance, distortion and filter effectiveness before the system is built.



CEE Relays Ltd.
87C Whitby Road
Slough
SL1 3DR
T: 01753 576477
F: 01753 825661
Web: www.ceerelays.co.uk

Features

- Large library of feeders, transformers, and harmonic sources.
- Models radial, loop systems, and multiple independent systems with multiple voltage levels.
- Models harmonic voltage sources at buses, and/or current sources at loads and motors.
- Automatic modeling of all standard transformer connections, phase shift, and triplet harmonic paths.
- Automatic modeling for the positive, negative and zero sequence networks.
- User definable utility harmonic impedance.
- Models all filters and capacitors in harmonic load flow.
- Models loads as series RL or parallel RL at harmonic frequencies.
- Models non-linear frequency dependent effects for cables and transmission lines.
- Models non-linear frequency dependent effects for transformers.
- Harmonic source phase angles included in calculations.
- Single tune and high pass filter design calculators.
- Calculate telephone interference factors (TIF, IT).
- Frequency spectrum and locus plots for current and voltage distortion.
- Up to 20 steps per harmonic order frequency scan for all system resonance points with self or mutual impedance options.
- Graphical results for voltage and current wave distortion.
- Graphical results for voltage and current frequency spectrum in log or linear scale.
- Graphical results for impedance frequency scan in log or linear scale.
- Comparison of multiple studies on the same graph.
- Detailed reports for distortion and frequency scan.
- Advanced sparse matrix and current injection techniques provide extremely fast solution times.
- Comprehensive documentation with teaching tutorial.

F I L T E R S P E C T R U M R E P O R T

Filter Name: 5th Filter (SingleTuned)
Bus Name: Filter Bus (12470V)

Harmonic Order	IR (Amp)	IL (Amp)	IC (Amp)	R (kW)	L (kVAR)	C (kVAR)	R (V)	L (V)	C (V)
1	295.15806	295.15806	295.15806	141.11436	294.00889	6773.48540	276.02977	575.10242	13249.4218
5	35.79039	35.79039	35.79039	2.07489	21.61494	19.91892	33.47092	348.67994	321.32069
7	10.92426	10.92426	10.92426	0.19331	2.81925	1.32553	10.21630	148.99812	70.05456
11	2.49738	2.49738	2.49738	0.01010	0.23153	0.04408	2.33553	53.52632	10.19140
13	2.05457	2.05457	2.05457	0.00684	0.18520	0.02525	1.92142	52.04212	7.09447
17	1.64299	1.64299	1.64299	0.00437	0.15487	0.01235	1.53651	54.42184	4.33837
19	0.97473	0.97473	0.97473	0.00154	0.06092	0.00389	0.91156	36.08511	2.30289
23	0.64065	0.64065	0.64065	0.00066	0.03186	0.00139	0.59913	28.71056	1.25037
25	0.60580	0.60580	0.60580	0.00059	0.03096	0.00114	0.56654	29.50938	1.08776
29	0.79191	0.79191	0.79191	0.00102	0.06138	0.00168	0.74059	44.74713	1.22580
31	0.31602	0.31602	0.31602	0.00016	0.01045	0.00025	0.29554	19.08831	0.45761

Capacitor Rated Voltage: 12470.00 Rated 3 Phase KVA: 6000.00
V_RMS: 13253.510 V_CREST: 13668.746 I_RMS: 297.547 KVA: 6794.820
V_RMS: 106.2832% V_CREST: 109.6130% I_RMS: 107.1103% KVA: 113.2470%
Limit: 110.0% Limit: 169.7% Limit: 180.0% Limit: 135.0%