SuperHarm®

Software for Harmonic Modeling and Simulation

SuperHarm evaluates harmonics on electric power systems. SuperHarm enables you to develop a computer model of a power system to explore variations on system loads and configurations, along with the resulting impact on system frequency response and distortion levels.

What SuperHarm Models

SuperHarm is available with a wide variety of device and source models. The software package contains

- generic harmonic voltage and current source model
- long-line corrected pi model
- simple RL branch model
- capacitor model
- balanced three-phase coupled line model.

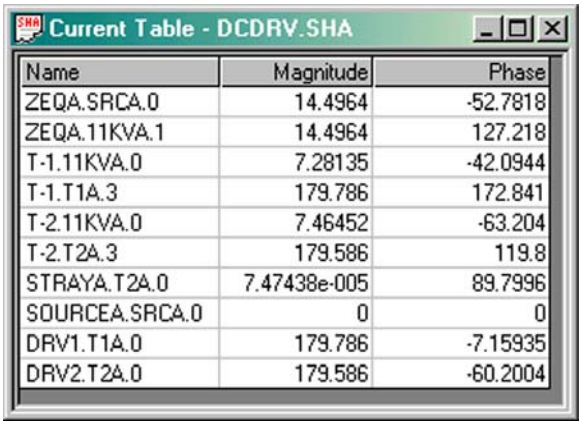
Also included are models for the modal representation of geometrically specified lines and cables, advanced load representations, induction and synchronous machines, and three-phase equivalents.

SuperHarm can solve both balanced and unbalanced three-phase systems. This is accomplished by using phase domain nodal admittance matrix techniques rather than sequence component solution methods.

How SuperHarm Works

The solution engine reads a user-created text file that describes the system to be simulated. SuperHarm's Circuit Description Language (CDL) consists of keywords representing device models as well as control commands. The devices are "connected" together by specifying alphanumeric names for the power system buses.

The solution engine reads the CDL file and converts into a binary form. After checking for errors, the solver calculates the nodal admittance matrix of the system for the first frequency to be solved. The resulting matrix is factored using LDL decomposition



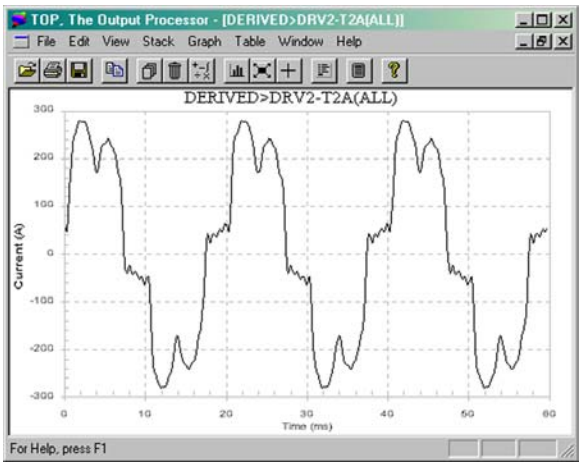
Name	Magnitude	Phase
ZEQA.SRCA.0	14.4964	-52.7818
ZEQA.11KVA.1	14.4964	127.218
T-1.11KVA.0	7.28135	-42.0944
T-1.T1A.3	179.786	172.841
T-2.11KVA.0	7.46452	-63.204
T-2.T2A.3	179.586	119.8
STRAYA.T2A.0	7.47438e-005	89.7996
SOURCEA.SRCA.0	0	0
DRV1.T1A.0	179.786	-7.15935
DRV2.T2A.0	179.586	-60.2004

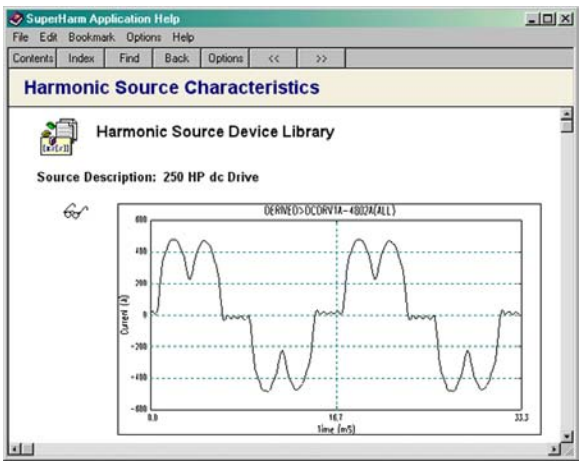
and a voltage solution vector is obtained by forward and backward substitution using the driving current vector. The solution vector is saved to the output file and the process is repeated for all requested frequencies.

The CDL syntax allows you to develop libraries of device and subsystem models. These models can have calling parameters and internal pre-processing formulas to facilitate the entry of nameplate data. The CDL, coupled with the SuperHarm front end, provides facilities for batch solutions of many cases with varying parameters.

The harmonic-producing load models allow you to enter either typical worst-case or actual measured data for the harmonic current injections. SuperHarm automatically scales this data to match the normal system conditions at the fundamental frequency.

SuperHarm utilizes TOP, The Output Processor® to visualize the simulation results. TOP takes advantage of the Microsoft® Windows® Graphical User Interface and clipboard to allow you to easily transfer data to programs such as Microsoft® Excel and Microsoft® Word.





TOP reads the resulting voltage solution vector file and manipulates, visualizes, and prints the results. Outputs available from TOP include

- Waveform & Spectrum Plots
- Frequency Response Plots
- Summary Tables (including IEEE 519 application)
- Summary Bar/Column Charts
- Cumulative Probability Plots
- Probability Density Charts

SuperHarm uses state-of-the-art modeling and solution methods to ensure efficient operation on desktop computers. Sparse matrix techniques are utilized to minimize solution times and storage requirements.

Support Options

Electrotek Concepts provides support for SuperHarm through PQSoft® Support Service, a comprehensive support offering for power system simulation and analytical tools. Features include upgrades, specialized models, and online resources. To learn more, send e-mail to **pqsoft@electrotek.com** or call 865-470-9222.

Availability

SuperHarm can be purchased directly from Electrotek. Pricing for network licenses, multi-user installations, and support options is quoted upon request. For more information, e-mail **info@electrotek.com** or call 865-470-9222.

SuperHarm Device Models Available:

- Branch
- Branch3
- Capacitor
- CMatrix
- Generator
- Induction Motor
- ISource
- Line
- LinearLoad
- NonLinearLoad
- PI
- PI3
- SeriesFilter
- Switch
- Synchronous Machine
- Transformer
- VSource
- ZYC Matrix

Electrotek Concepts • 9040 Executive Park Drive, Suite 222 ☐☐ • Knoxville, TN 37923
Phone: 865•470•9222 FAX: 865•470•9223
E-mail: info@electrotek.com www.electrotek.com