



## CYMFLOW - Power Flow Analysis

The CYMFLOW software is the power flow analysis module of the CYME power engineering software for the analysis of three-phase electric power networks. It is equipped with powerful analytical options and alternative solution techniques.

### Execute power flow analysis on three-phase electric power networks.

#### Program Features

The objective of a power flow program is to analyze the steady-state performance of the power system under various operating conditions. It is the basic analysis tool for the planning, design and operation of any electrical power system, be they distribution, industrial or transmission networks.

The CYMFLOW software utilizes state-of-the-art sparse matrix/vector methods and multiple solution algorithms:

- Full Newton-Raphson
- Fast Decoupled
- Gauss-Seidel

The CYMFLOW program is the main module of the CYME software for the analysis of industrial and transmission power systems, and it has a seamless interface with other modules such as:

- CYMFAULT: for fault studies taking into account pre-fault system loading
- CYMHARMO: for the calculation of the fundamental frequency voltage and current profiles required for harmonic distortion indices calculations
- CYMSTAB: to set the initial condition of the system as required by the network control models for transient stability studies
- Dynamic Motor Starting module: to account for system wide voltage drops during induction and synchronous motor starting studies

The screenshot displays the CYMFLOW software interface. The main window shows a power system diagram with various components like buses, lines, transformers, and motors. A 'Load Flow Analysis' dialog box is open, showing configuration options for the analysis. The dialog includes sections for Calculation Method, Convergence Parameters, Load and Generation Scaling Factors, and Voltage and Frequency Sensitivity Load Model.

Bus	V (pu)	V (kV/L)	P/Motor (MW)	Q/Motor (MVAR)	Load (MW)	Load (MVAR)
4	0.997	13.762	0.00	0.00	0.00	0.00
5	0.963	4.007	1.50	0.72	0.00	0.00
6	0.978	6.465	1.33	0.54	0.00	0.00
7	1.000	13.800	0.00	0.00	0.00	0.00
8	0.962	6.471	0.69	0.34	0.00	0.00
9	0.997	13.762	0.00	0.00	0.00	0.00
10	0.969	2.325	3.15	1.53	0.00	0.00
11	0.967	2.305	0.43	0.21	0.00	0.00

# CYMFLOW - Power Flow Analysis

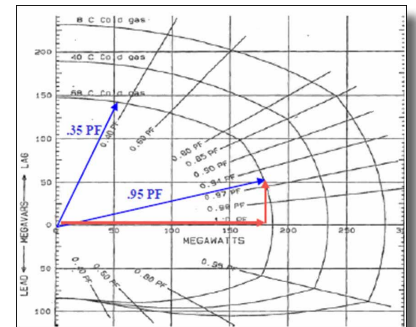
Execute power flow analysis on three-phase electric power networks.

## Analytical Capabilities

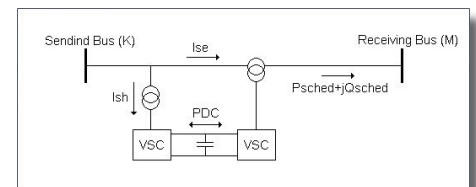
- Analyzes networks with thousands of buses and branches
- Multiple swing buses allowed
- Automatic swing bus selection for isolated subsystems
- Simultaneous solution for islanded networks
- Detailed equipment modeling of induction and synchronous motors, variable frequency drives, bus ways and all necessary network elements for an accurate representation of the network
- Synchronous generator
  - Reactive power limits and remote voltage control
  - Generator reactive power capability curves
- Local or remote control of voltage and reactive power flow through tap changing transformers
- Phase angle shift transformer with active power control
- Cogeneration modeling including:
  - Induction generators
  - Wind Energy Conversion Systems (WECS)
  - Photovoltaic (PV Cells)
  - Fuel cells
  - Micro-turbines
- Comprehensive representation of DC transmission lines with rectifier and inverter controls

- Flexible AC Transmission Systems (FACTS) representation of:
  - Static synchronous compensator (STATCOM),
  - Unified Power Flow Controller (UPFC)
- Customer load model library manager for any type of load model including:
  - Constant power, constant current and constant impedance
  - Composite load model
  - Voltage sensitivity exponent load model
- Capacitors with the following control types: voltage, current, reactive current, reactive power, power factor, temperature and time-controlled
- Switchable shunt banks of both capacitive and inductive elements
- Scaling factors applied to the generators and to the loads on the whole network or by zone
- Global parameters to include or exclude any types of equipment from the analysis
- Five limit categories for nominal, planning, emergency loading or any user-defined criteria
- User-defined units for bus voltages, generator productions and branch flows on both one-line diagrams and tabular reports

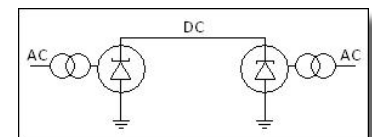
- Tabular reports can also be directly exported to other spreadsheet programs such as Microsoft Excel®
- Color coding on the network one-line diagram as per user-defined criteria; for example:
  - Overloaded equipment
  - Voltage violations of buses and nodes
  - Visualization of conductor rating that may reflect, for example, improperly sized cables
  - System voltage levels



Generator Capability Curves



Power Electronics - FACTS



Power Electronics - DC Systems

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