MathWorks®
Accelerating the pace of engineering and science

Electric Utilities

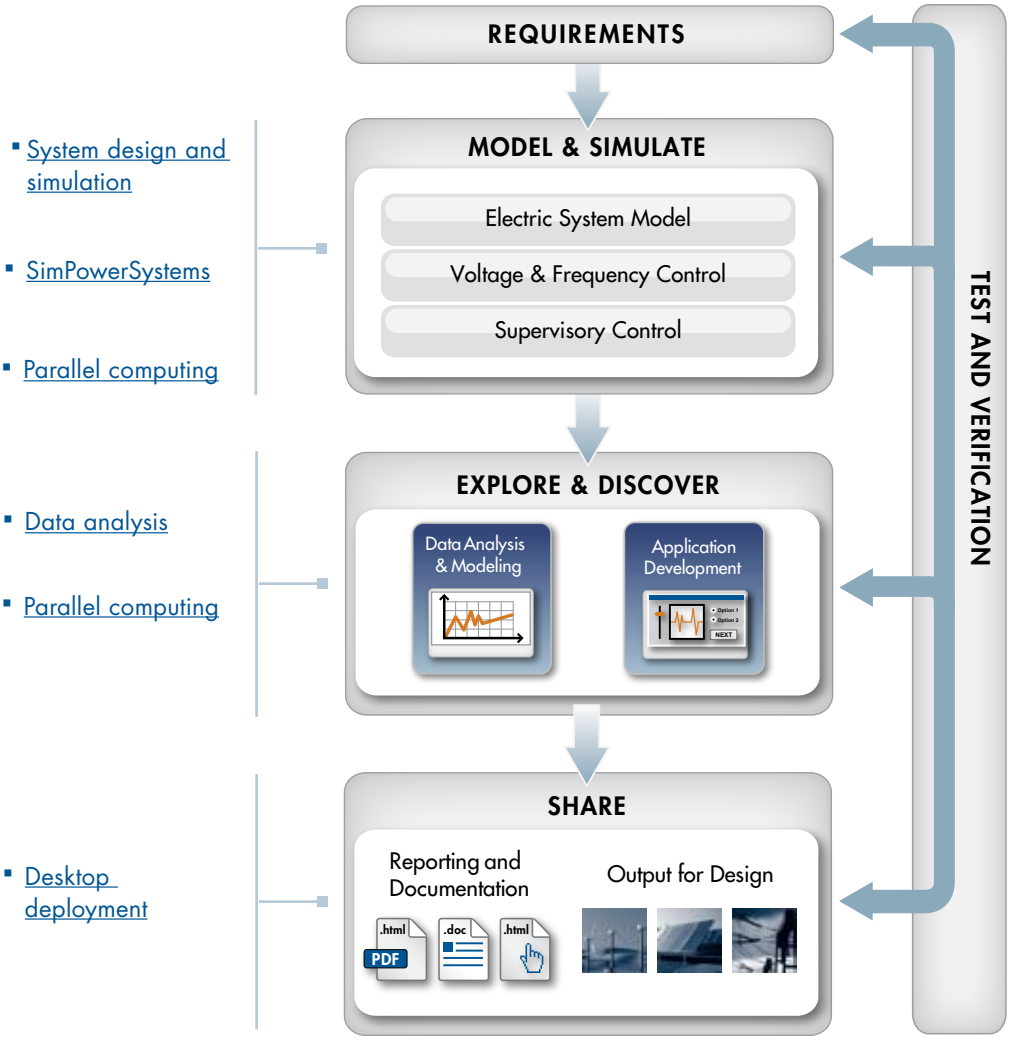
Information Kit

Contents

Workflow for Electric Grid Modeling

Power generation continues to evolve into increasingly coupled systems of electrical and economic dynamics. To optimize power generation performance, engineers, and scientists use MathWorks software to model and simulate electric transmission and distribution systems.

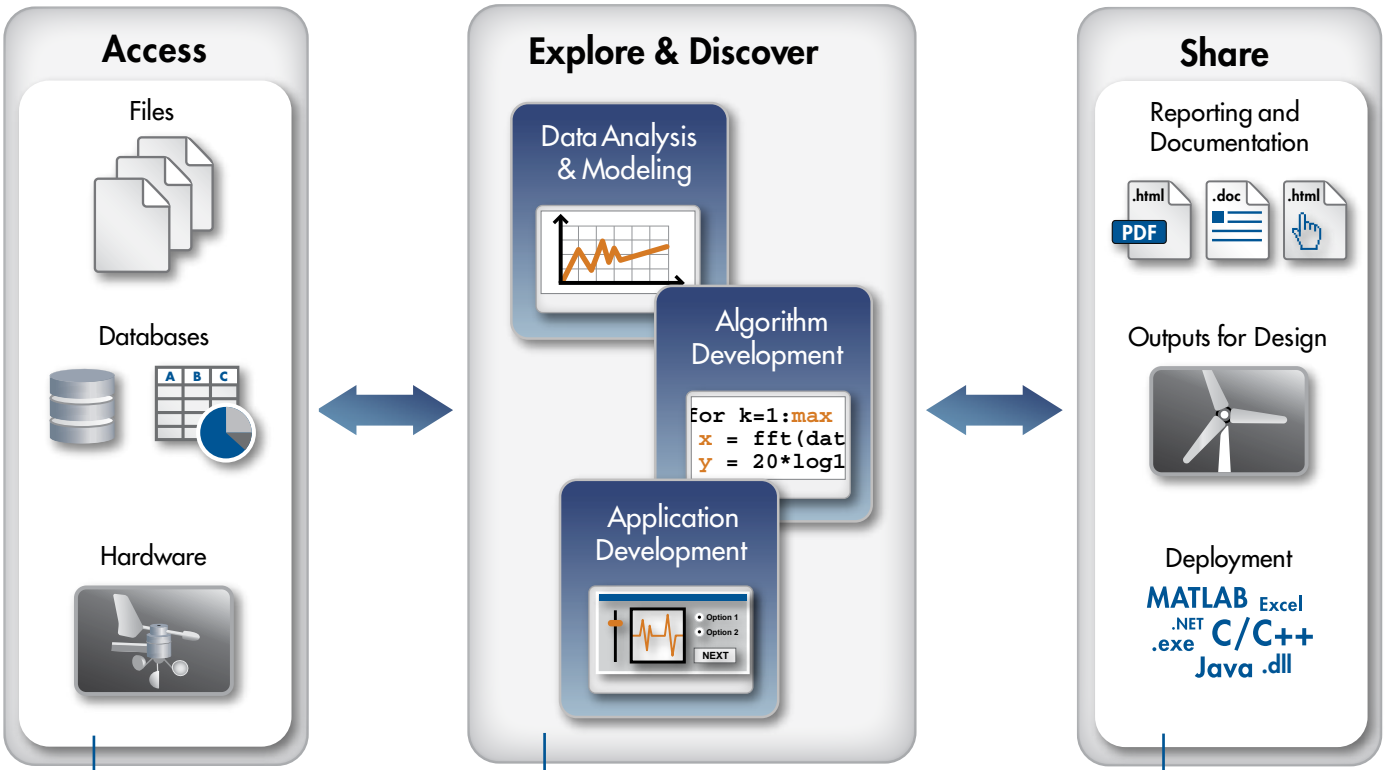
» Learn more



Workflow for Technical Computing

Power generation continues to evolve into increasingly coupled systems of electrical and economic dynamics. To optimize power generation performance, engineers, and scientists use MathWorks software to monitor and process data to improve power generation efficiency and reliability.

» Learn more



- Data acquisition

- Data analysis
- Mathematical modeling
- Algorithm development
- Parallel computing

- Desktop and Web deployment

User Stories

- **UNION FENOSA Predicts Energy Supply and Demand Using MathWorks Tools**
  » Read story

- **Albatroz Engineering Develops Automated, Real-Time Power Line Inspection System with MathWork Tools** » Read story

- **Horizon Wind Energy Develops Revenue Forecasting and Risk Analysis Tools for Wind Farms** » Read story

Technical Articles

- **Improving Optimization Performance with Parallel Computing** » Read article

  Engineers, scientists, and financial analysts frequently use optimization methods to solve computationally expensive problems such as smoothing the large computational meshes used in fluid dynamic simulations, performing image registration, or analyzing high-dimensional financial portfolios. However, computing a solution can take anywhere from hours to days.

- **Enhancing Multicore System Performance Using Parallel Computing with MATLAB** » Read article

  MATLAB and Parallel Computing Toolbox address the challenge of getting code to work well in a multicore system by enabling you to select the programming paradigm most appropriate to your application. Using a typical numerical computing problem as an example, this article describes how to use the two most basic of these paradigms: threads and parallel for-loops.

On-Demand Webinars

- **MATLAB for Excel Users** » View webinar

  Many technical professionals find that they run into limitations using Excel for their data analysis applications. MathWorks engineers will show how MATLAB can supplement the capabilities of Excel by providing access to thousands of pre-built engineering and advanced analysis functions and versatile visualization tools. They will also show how you can increase computational speed and handle larger data sets.

- **Investigating Reactive Power Management of Mixed-Technology Wind Farms Using Modeling and Simulation** » View webinar

  MathWorks engineers will demonstrate how modeling and simulation allows effective investigation of reactive power management within the context of a mixed-technology wind farm, with consideration of squirrel-cage and DFIG wind turbines. The demonstration will consider model abstraction techniques to improve simulation speed, including the use of average-value power-electronic converters and aggregated wind turbine representations.

- **Model-Based Design for Solar Power Systems** » View webinar

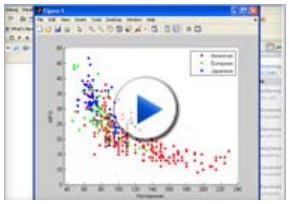
  Learn how to model a photovoltaic system that includes the array, the power converters and inverter electronics, and typical loads. MathWorks engineers will show to use simulation to perform design trade-offs and to develop and test control algorithms, including maximum power point tracking (MPPT). As a final step, they will automatically generate code for the control algorithms directly from the simulation model.

Key Products for Technical Computing

MATLAB » Learn more

The Language of Technical Computing

MATLAB® is a high-level language and interactive environment that enables you to perform computationally intensive tasks faster than with traditional programming languages such as C, C++, and Fortran.



Statistics Toolbox » Learn more

Perform statistical analysis, modeling, and algorithm development

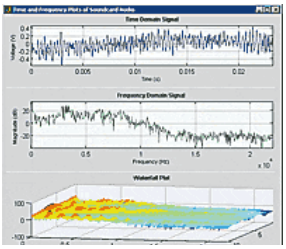
Statistics Toolbox™ provides a comprehensive set of tools to assess and understand data. Statistics Toolbox includes functions and interactive tools for modeling data, analyzing historical trends, simulating systems, developing statistical algorithms, and learning and teaching statistics.

Key Products for Technical Computing

Database Toolbox » Learn more

Exchange data with relational databases

Database Toolbox™ enables you to exchange data between MATLAB® and any ODBC/JDBC-compliant database. With the Visual Query Builder tool within the toolbox, you can query stored data without needing to know or learn SQL. This gives you the ability to access, analyze, and store your data quickly and easily from within MATLAB.



MATLAB Compiler » Learn more

Build standalone executables and software components from MATLAB code

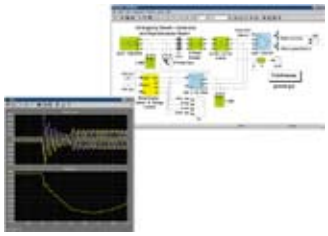
MATLAB Compiler™ lets you share your MATLAB application as an executable or a shared library. Executables and libraries created with the MATLAB Compiler product use a runtime engine called the MATLAB Compiler Runtime (MCR). The MCR is provided with MATLAB Compiler for distribution with your application and can be deployed royalty-free.

Key Products for Electric Grid Simulation

- **Simulink** » Learn more

Simulation and Model-Based Design

Simulink® is an environment for multidomain simulation and Model-Based Design for dynamic and embedded systems. It provides an interactive graphical environment and a customizable set of block libraries that let you design, simulate, implement, and test a variety of time-varying systems, including communications, controls, signal processing, video processing, and image processing.

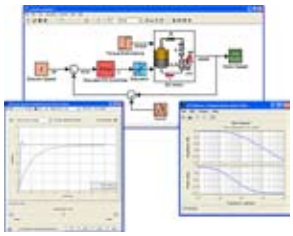


- **SimPowerSystems** » Learn more

Model and simulate electrical power systems

SimPowerSystems™ extends Simulink with tools for modeling and simulating the generation, transmission, distribution, and consumption of electrical power. It provides models of many components used in these systems, including three-phase machines, electric drives, and libraries of application-specific models such as Flexible AC Transmission Systems (FACTS) and wind-power generation. Harmonic analysis, calculation of Total Harmonic Distortion (THD), load flow, and other key power system analyses are automated. SimPowerSystems models can be discretized to speed up simulations.

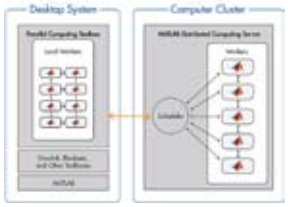
Key Products for Electric Grid Simulation



Simulink Control Design » Learn more

Compute PID gains, linearize models, and design control systems

Simulink Control Design™ lets you design and analyze control systems modeled in Simulink. You can automatically tune the gains of PID controllers to meet performance requirements. With this product you can also nonintrusively find operating points and compute exact linearizations of Simulink models at various operating conditions. Simulink Control Design provides tools for computing simulation-based frequency responses without modifying your model. A graphical user interface (GUI) lets you design and analyze arbitrary control structures modeled in Simulink, such as cascaded, prefilter, regulation, and multiloop architectures.



Parallel Computing Toolbox » Learn more

Perform parallel computations on multicore computers and computer clusters

Parallel Computing Toolbox™ lets you solve computationally and data-intensive problems using MATLAB and Simulink on multicore and multiprocessor computers. Parallel processing constructs such as parallel for-loops and code blocks, distributed arrays, parallel numerical algorithms, and message-passing functions let you implement task- and data-parallel algorithms in MATLAB at a high level without programming for specific hardware and network architectures. As a result, converting serial MATLAB applications to parallel MATLAB applications requires few code modifications and no programming in a low-level language. You can run your applications interactively or offline, in batch environments.

Additional Energy Segments

Engineers and scientists worldwide rely on MathWorks software to perform the challenging analysis, simulation, and product development tasks necessary to address the world's energy needs. You can use MATLAB and Simulink to evaluate energy resources, develop systems for power generation and distribution, model energy markets, and create products that consume less energy and are environmentally friendly.

Electric Vehicles

Electric Utilities

Solar Power

Oil and Gas

Wind Power

Trading and Risk