



Wind Turbine Control Toolbox for Matlab

The Wind Turbine Control Toolbox, for use with MATLAB®, provides you with all of the tools needed to design and test control systems for wind turbines all within the MATLAB environment.

Features

The Wind Turbine Control Toolbox provides a comprehensive set of functions for the design, simulation, and analysis of wind turbines and their control systems. Specific features include:

- Wind models including deterministic, stochastic and wind farm models. Includes GIS wind data interface.
- Electric generator models including permanent magnet, reluctance and induction.
- Multibody wind turbine model
- Easy to use simulation graphical user interface
- Estimation algorithms including extended Kalman Filter and the Unscented Kalman Filter.
- Fault detection algorithms including detection filters and parity space methods.

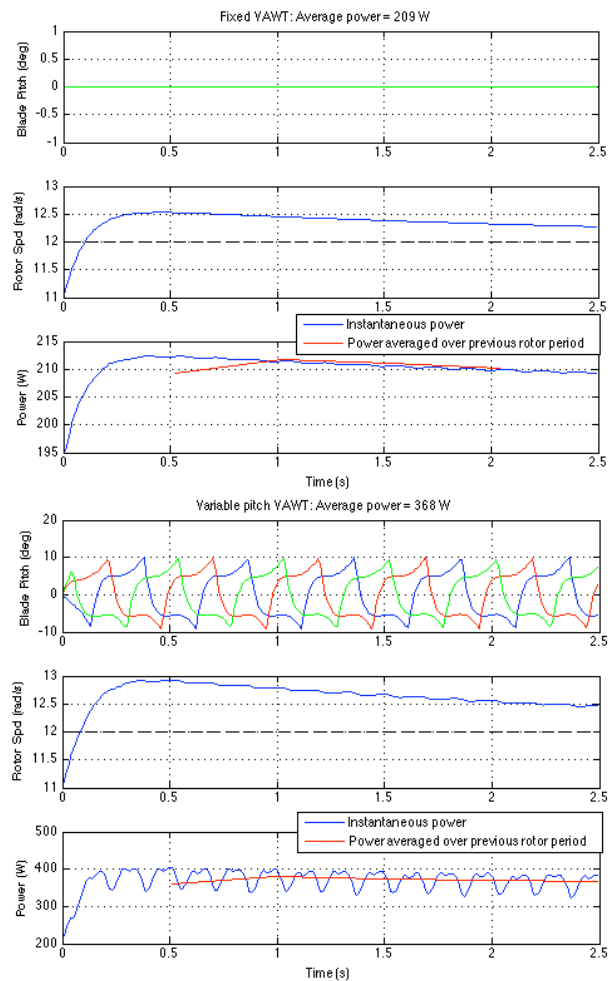
Every function is fully documented. Descriptions of the inputs and outputs are provided, along with examples for proper usage. References to relevant textbooks, papers, and websites are included throughout. Most functions include built-in demos, which automatically produce illustrative plots. In addition, a powerful *FileHelp* system is provided with the toolbox – it enables you to search all function titles and headers for keywords so that you may navigate the depth of the toolbox with ease. Numerous demo scripts are included.

Prototype Systems Quickly

The Wind Turbine Control Toolbox allows you to design and test control systems in a matter of hours, not days or weeks. You can simulate a variety of turbine configurations. Changes are easy to make and you have excellent visibility into the resulting software. Prototyping your control systems and simulation models will reduce both development time and cost. MATLAB frees you from the expensive edit/compile/link cycle because it is interpretive and fully interactive. The MATLAB code can be easily ported to C++ using the Princeton Satellite Systems MatrixLib software.

Controller Design

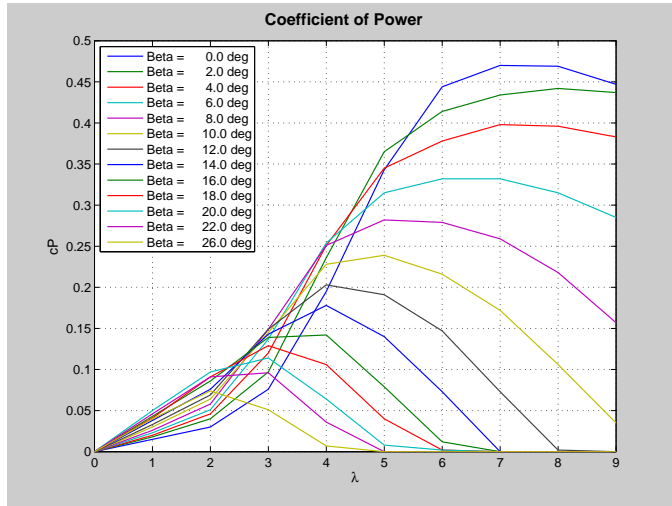
The toolbox provides a variety of control design tools including frequency domain, eigenstructure, output feedback, Lyapunov based nonlinear and linear quadratic design functions. For example, the plots below show the advantage of using blade pitch control in a Vertical Axis Wind Turbine.



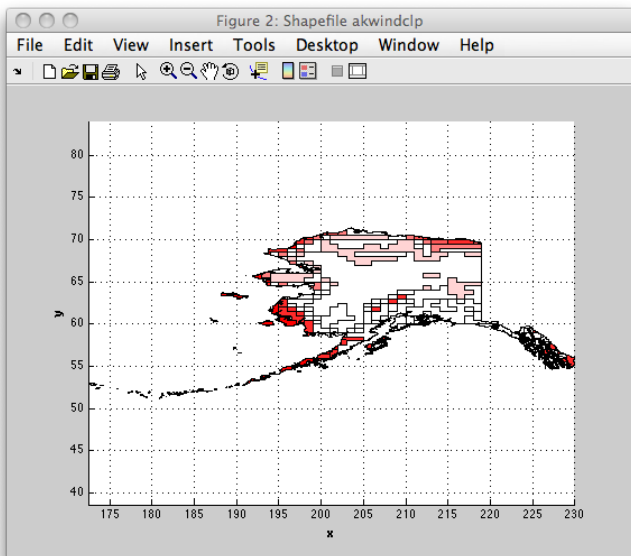
The toolbox also includes a variety of tools for building state and parameter estimators. These include Kalman Filters, Extended and Extended Iterated Kalman Filters along with Unscented Kalman Filters. Fault detection algorithms, including detection filters and parity space methods are included.

Wind Models

Wind models include deterministic with tower shading and stochastic models. Power coefficient models for both HAWT and VAWT are included. Blade element models for vertical and horizontal axis wind turbines are included.



In addition the toolbox can read NREL GIS wind files.



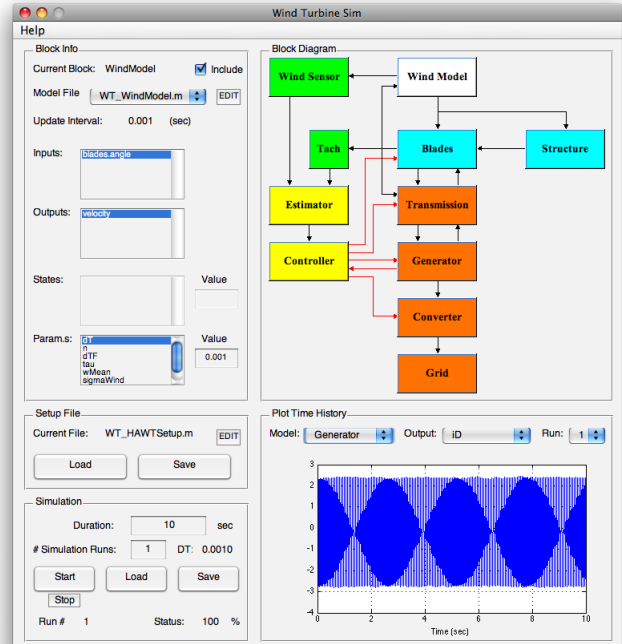
Wind Turbine Modeling

Models for every element of wind turbine systems are included. This includes rotor/wind interaction models, generator models, motor models (for actuating pitch control), electric system models (including inverters, circuit elements and the grid). Gen-

erator and inverter models include both Direct-Quadrature and ABC models. The toolbox includes a multi-rigid-body model that allows you to model all the articulated components. Joints can be rotational or prismatic. Any topological tree can be modeled. The multibody code uses an efficient recursive solver.

Graphics and Simulation

The toolbox provides a GUI that allows you to organize the various dynamical models in a wind turbine.



Support

The toolbox comes with full email and telephone support for 1 year. In addition Princeton Satellite Systems offers design support including custom functions and scripts for a very reasonable price.

Compatibility

The toolbox is compatible with MATLAB v7, Windows XP/NT/2000, UNIX, and MacOS X.

Contact Us

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