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| Model Name: Active Load/alpha\_betaActiveLoad | | |
| Name and affiliation of author or POC:  Ed Corbett, MIT Lincoln Laboratory | Model Symbol: | Accreditation:  Model implements an PQ load capable of following an independent command profile. Based on library blocks originating in Matlab™ toolbox libraries. |
| Date of Publication:  8/4/2016 |
| Version Information:  1.0 |
| Model accessibility (open source, license, …):  HIL Members Only |
| Model Description and Theory of Operation:  This model provides a 3-phase, balanced controlled current source that will draw real and reactive power from a bus. The power drawn will follow a time-varying commanded P and Q input to the block (in kW and kVA) by comparing the commanded P/Q to the actual P/Q as measured by a 3-phase power meter that is a member of the SimPowerSystems™ library and using the error to drive a PID servo loop.  The real power corresponds to current flowing in-phase with each phase voltage, and the reactive power corresponds to the current flowing in quadrature (positive Q means current lagging voltage) with each phase voltage. The in-phase axis is arbitrarily called the alpha axis (similar to the d-axis in a rotating machine and not to be confused with the alpha axis of the Clarke transform) and the quadrature axis is arbitrarily called the beta axis (similar to the q-axis in a rotating machine and not to be confused with the beta axis of the Clarke transform).  A PID servo loop generates the alpha current command based on compensation of the difference between real power command and actual real power, and the beta current command based on the compensated difference between the reactive power command and the actual reactive power. A SimPowerSystems™ phase lock loop block is used to generate the phase reference for the alpha-beta to abc transform and also to isolate the actual bus voltage feedback from the voltage drop across the load caused by the current sources. | | |
| Model Specifications:   1. Loop time constant: 1 second 2. Maximum bus voltage: unlimited 3. Maximum current: unlimited 4. Fault logic: Measured bus voltage within +/- 50% of rated bus voltage shuts off current sources   Assumptions and Limitations   1. Balanced 3-phase system 2. Dynamic load frequency content adequately represented by loop time constant 3. Ballast load required for current source connection | | |
| Interfacing Information (platform, input requirements, possible outputs):  Platform: The model is intended for real-time execution on an OPAL RT target  Inputs and Outputs:  3-phase bus connection  3-phase return connection  P,Q power profile input in kW and kVA  Nominal bus voltage in V RMS line-to-line  Parameters:  PID gains | | |
| Diagrammatic Representation of Model Internals: | | |
| Model Validation (technique used, evidence): N/A | | |
| Simulation Platform, Solvers:  Matlab 2013a with Simscape. A discrete solver with 100 us time step was used. | | |
| Known Issues: | | |
| Models which use this block (see associated documentation of these models):  Energy/HIL/Components/CHP and Thermal/CHP\_Test\_Model.slx  //llcad-svn/svn/feeder-microgrids/branches/salcedo/Development and unit testing/DEMOS/Integration\_Relay\_NG\_v2/DeviceIntegrationTest\_Model\_1.slx  https://llcad-svn/svn/feeder-microgrids/branches/salcedo/Development and unit testing/DEMOS/Integration\_Relay\_NG\_v2/CHP\_Test\_Model.slx | | |