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| Model Name: NG\_Genset\_lib/Generator | | |
| Name and affiliation of author or POC:  Ed Corbett, MIT Lincoln Laboratory | Model Symbol: | Accreditation:  Prime mover character-  Istics based on published data for GE/Jenbacher  J620 NG engine. Model not validated through  Independent testing. |
| Date of Publication:  7/9/2016 |
| Version Information:  1.0 |
| Model accessibility (open source, license, …):  HIL Members Only |
| Model Description and Theory of Operation:  This model provides a model of a GE/Jenbacher 3.5 MW natural gas fueled engine coupled to a SimPowerSystems synchronous generator. In addition, a Woodward easYgen 3500 secondary controller for speed and voltage is included, along with I/O interfaces to allow the model to execute on an appropriately configured OPAL real-time target for hardware in the loop testing.  The engine model is a physics-based performance model derived from information contained in the two references cited below. It includes turbocharger-fed valve body, intake distribution manifold and engine combustion subsystems. The engine is coupled to a 4-pole, salient rotor 3.5 MVA synchronous generator derived from the Mathworks’ SimPowerSystems library. NB: At the top level, the model bit “SIL\_HIM” needs to be set to “0” for simulation mode and to “1” for HIL mode, using the OPAL platform.  List of References:   * Heywood, J.B., 1988 *Internal combustion engine fundamentals,* McGraw Hill, NY. * Gangopadhyay A. and Meckl, P., 2001 “Modeling and Validation of a Lean Burn Natural Gas Engine”, ASME Journal of Dynamic Systems, Measurement and Control Vol 123 pp. 425-430. | | |
| Model Specifications:   1. Prime Mover    1. Fuel: Natural gas    2. Cylinders: 20    3. Displacement: 125 liters 2. Generator    1. Salient rotor, 4-pole, 13.8 kV, 3.5 MVA, 60 Hz synchronous 3. Secondary controller: Woodward easYgen 3500 (speed and voltage)   Assumptions and Limitations   1. Some safety features of Woodward controller have been relaxed to accommodate model transients 2. Emissions and thermal recovery assumed proportional to fuel consumption rate | | |
| Interfacing Information (platform, input requirements, possible outputs):  Platform: The model is intended for real-time execution on an OPAL RT target  Inputs:  Analog and digital inputs for AVR and governor bias and control; relay V and I measurements  Outputs:  3-phase current, voltage, speed; relay control  Real and reactive power  Parameters:  Thermal efficiency: 50%  Boost pressure: 8 bar | | |
| Diagrammatic Representation of Model Internals: | | |
| Model Validation (technique used, evidence): | | |
| Simulation Platform, Solvers:  Matlab 2013a with Simscape. A discrete solver with 100 us time step was used. | | |
| Known Issues: | | |
| Models which use this block:  Energy/HIL/Components/Genset/NGGenset\_Test\_System.slx  Energy/HIL/Components/CHP and Thermal/CHP\_Test\_Model.slx | | |