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| Model Name: Motor\_InductionMachine\_lib/Motor | | |
| Name and affiliation of author or POC:  Ed Corbett, MIT Lincoln Laboratory | Model Symbol: | Accreditation:  Based on Simulink™ 3-phase asynchronous, smooth rotor machine model utilizing stationary reference frame for stator quantities and coupled rotor and stator equations |
| Date of Publication:  8/16/2016 |
| Version Information:  1.0 |
| Model accessibility (open source, license, …):  HIL Members Only |
| Model Description and Theory of Operation:  This library model represents a 200 hp 3-phase induction motor capable of full voltage starting and running no-load at nominally 1800 RPM ( i.e., it is wound as a 4-pole machine). It is based on a motor model available in the Simulink/SimpowerSystems™ library and therefore it adheres to the specifications and descriptions published by Mathworks for that motor. The motor is configured to allow an independent shaft torque to be applied to the motor output shaft. This torque may be derived from quantities that are a function of motor shaft speed and acceleration  The motor model includes an internal circuit breaker with relay logic interface, as well as a ballast load for numerical stability. Internal switching was added to the motor so that motor current could be abruptly interrupted by an ideal switch without affecting the stability of the solution to the motor equations. The model uses a stationary reference frame for stator quantities.  List of References:   * Mathworks /Simulink “Asynchronous Machine” model description | | |
| Model Specifications:   1. 3-Phase, 4-pole single squirrel cage induction motor    1. Rated voltage: 480 Vrms line-to-line, 60 Hz    2. Nominal power: 160 kVA    3. Stator connection: Wye    4. Stator and rotor resistances and inductances: see reference   Assumptions and Limitations  1) When disconnected from 3-phase source, stator voltage and current are clamped to zero to eliminate singularities in the solution which would otherwise lead to numerical instability   1. Solver should be run using a stationary reference frame to accommodate discontinuous stator voltage (i.e., ideal circuit breaker open/close) | | |
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| 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:  1) Solver is unstable with discontinuous stator voltage unless stator voltages are clamped to zero when disconnected. | | |
| Models which use this block:  Energy/HIL/DistributionSystems/SimulinkOpal/Banshee/BANSHEE\_SYSTEM.mdl  Energy/HIL/Components/SimulinkOpal/Motor/IM200HP\_Test\_Model\_v2.mdl | | |