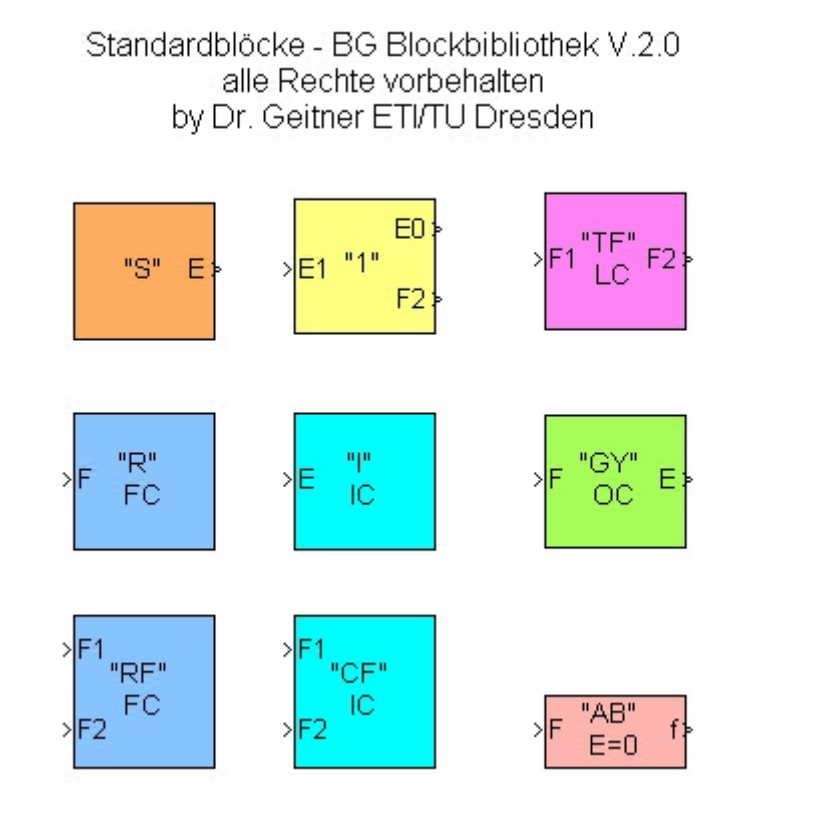
Add-on library BG V.2.0 for graphical programming of Bond Graphs by means of Simulink

[http://www.eti.et.tu-dresden.de/ae/ae_8e.htm → http://www.eti.et.tu-dresden.de/ae/ae_8_1e.htm]



Links:

Download of BG V.2.0 inclusive examples and documentation.

Lists of examples:

- Rotating DC machine, Belt conveyor
- Mechatronics
- Three-phase machines

Summary of block icon, functionality and block mask as well as parameter input in as list.

BG V.2.0 - available documentations:

- Verbal description of elements (blocks) and feasible adjustments (block mask menu)
- Tabulated summary of the features of the elements (blocks)
- Tabulated summary of the dialog box parameters of the elements (blocks)
- Listed application hints regarding BG V.2.0 as a Bond Graph block library using Simulink
- The internal measurement of effort and flow inside of Simulink Bond Graphs
- Prepared appearance forms of node blocks in Simulink Bond Graphs
- Bond Graph and Simulink Bond Graph representation for the examples of part 1 and 2
- Summary of specifics of the examples regarding the Simulink block library

Examples "Mechatronics" including a specification of numbers and pages with kind authorization refer to: Scherf, H. E. "Modellierung und Simulation dynamischer Systeme", Oldenbourg Verlag, 2003.

Realization independent approaches for state control structures offers: Zäh, M.; Brandenburg, G. "Das erweiterte Dämpfungsoptimum", Automatisierungstechnik (at) Bd. 35 (1987) H.7, S. 275/83.

Suggestions regarding the Kelvin-Voigt-Element and the modeling of a belt conveyor contains: Drüßner, U. “Development of Real-Time Minimal Models for Belt Conveyor Systems”, in Proceedings of the 2004 International Power Electronics and Motion Control Conference (EPE-PEMC), CD: A77441.

Some examples refer to a comparison to likewise power flow oriented modeling methods "Power Oriented Graph (POG)" by R. Zanasi (Modena / Italy) and "Energetic Macroscopic Representation (EMR)" by A. Bouscayrol (Lille / France) - see International Workshop "Modelling and control of electrical systems (MCES)", Lille, Nov. 13./14. 2006.

Parameterisation

Please note the correct input of parameters regarding the units and the positioning of the parameter within the underlying equation. Please do not use unit prefixes as a basic principle. The product of effort and flow must be a power value for each bond connection and in each energy domain.

Parameter input possibilities

1) The easiest possibility is the input of constant numerical values within a block mask. Depending on the context of the considered Bond Graph part the input has to be a scalar, vector or matrix.

   Hint:
   This mask input will be always directly accessible independently of the button "Block function tunable".

2) An other possibility is the input of a symbolic parameter at the respective block mask plus the definition of a m-file of the same name like the simulink project containing the Bondgraph (*.mdl) AND name extension "_P" [example: SM_BG_01.mdl and SM_BG_01_P.m]. This m-file has to realize assignment or computation of numerical values to symbolic parameters. Opening the simulink project causes automatic parameter loading in this case. Please note version BG V.2.0 does not clear variables.

   Hint:
   To share the same m-file of parameter definition for several Bondgraphs primary open those simulink project (mdl-file) of same name even if it will not be used then - compare DC machine examples.

3) The third possibility concerns variable parameters. Switching to this mode causes one or two additional block inputs. The necessary paramater computation has to be done by a user defined subsystem - compare example lift magnet.

   Hint:
   Non-linear parameter computation is typically dependent on directly accessible values for momentum and displacement (additionally outputs of energy storages) as well as on measured values for effort and flow (use of blocks AB as "activated bonds").