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This is the updated BSM1 version finished in principle in 2007-12-14. This BSM1 version is based on the same principles as defined in the COST book (Copp, 2002) and calculates the evaluation criteria etc the same way. However, it also calculates the evaluation criteria based on the recent changes to the BSM (based on BSM2 principles) – so it can be used for easy comparisons of the criteria and to check other platform implementations. The final updates related to risk index calculation was added in April 2009.

Update 2020: The perf_plant script is now updated to work with R2019b onwards.

Sensors and actuators and noise have been updated compared to the COST book, i.e. this version includes the new models for sensors and actuators (all classes are available in sensors_actuators.mdl). Carbon addition has been prepared for all reactors. Some small problem with anti-windup for the controllers was fixed (compared to the COST book version) and some small corrections in some state initialisation files. A new c-file carboncombiner.c has been added. In the COST book the results were not completely correct since there was an error in the hyddelay function. This is now corrected. Steady state and openloop results are basically identical to the COST book (if you compare results using the old criteria) but the closedloop version results are obviously different since the sensors and actuators are different.

The BSM1 plant is now harder to control.

A few storage variables have changed names (SO5reg) and some others have been added (SO5sensor, SNO2sensor, kla1in, kla2in, kla3in, kla4in, kla5in, carbon1in, carbon2in, carbon3in, carbon4in, carbon5in). A new initfile (sensorinit.m) is used to define parameters for all sensors and actuators and defining noise etc.

The simulation time has increased somewhat due to more complex sensors and more noise. Also a higher default numerical tolerance is used (abs tol 1e-8 and rel tol 1e-5) to be able to maintain (almost) perfect balance for flow in and out of the plant in closed loop conditions.

The files perf_plant.m and perf_controller.m have been updated. Especially perf_plant since it now calculates all evaluation criteria based both on the original BSM1 criteria and also based on the decided new criteria (TG minutes meetings 7, 8 and 9 and other TG documentation). perf_plant now also calls the script perf_risk where the risk for various settling problems are calculated (courtesy of LEQUIA, Girona University, Spain).

Otherwise, the model should be used and simulations carried out exactly as before:

Add the top directory (the one where this file is) to your Matlab path, recreate the influent data files and noise file from ASCII-versions in the directory influent_files by running convert.m, mex everything using mexall, open benchmark (or benchmarkss or openloop (in directory openloop)), run benchmarkinit (or openloopinit), start a simulation, get results by running perf_plant and perf_control. Then it is up to you to start modifying things.

All influent files are now available in the Simulink window and selected using triggers.

The system works fine on Matlab ver R2006a (i.e. ver 7.2) and should work fine using any newer version. It has not been tested using Matlab 6 (and there will probably be problems due to the Simulink models).

2009-05-21, Dr Ulf Jeppsson