CYBERNETICA

Model based control systems for the process industry

eMPC

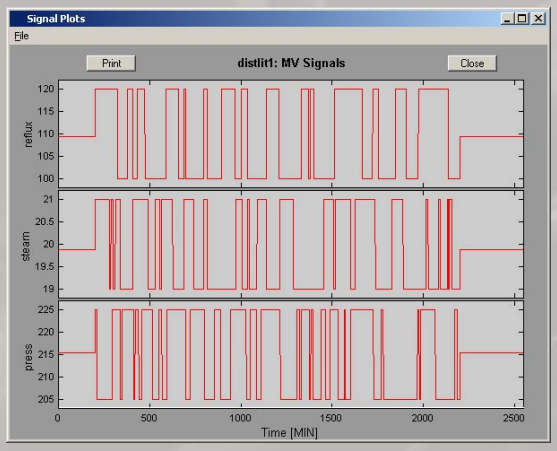
Cybernetica eMPC offers an easy and flexible way of controlling plants by use of Model Predictive Control (MPC) techniques. Empirical process models are obtained directly from plant experiments. eMPC may give explicit control of quality parameters and other critical process variables, and the result will be higher capacity and production closer to constraints.

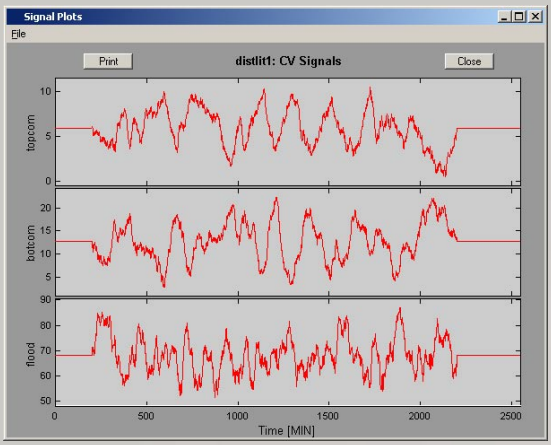
MPC with data driven models

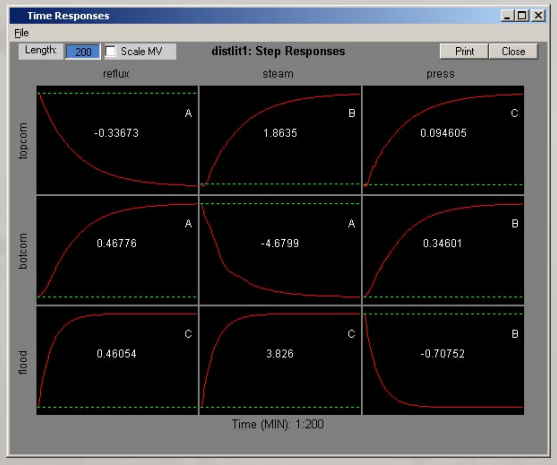
MPC (Model Predictive Control) with linear data driven (empirical) models was introduced more than 20 years ago in the refinery- and petrochemical industry. The technology has later been installed successfully in a variety of continuous, industrial processes, especially in units having moderate changes in operating conditions (setpoints).

Both Cybernetica CENIT and Cybernetica eMPC solves the MPC problem, but in eMPC empirical or data driven models are used instead of "first principles"/ mechanistic models. In most cases, the empirical models will be linear, possibly with non-linear transforms on output and/or input variables. However, the eMPC algorithm can handle all kinds of empirical non-linear MPC models (e.g. "neural nets"), if needed.

If linear models are used, the tool Tai-Ji ID from Tai-Ji-Control establishes robust MPC models based on systematic plant tests. The duration of the test period will be from a few days to a couple of weeks, dependent of the MPC application size. The Manipulated Variables (MVs) may be perturbed simultaneously, as indicated in the plot below. The Controlled Variables (CVs) are recorded as functions of both the MV steps and the natural changes in Disturbance Variables (DVs) through the test period. Individual models from each MV/DV to each CV are established.







Improve performance

Cybernetica eMPC provides you with a flexible MPC tool suitable for a large variety of continuous process plants. This is done by making de-coupling, feed-forward, feedback and constraint handling in one controller operation. Your plant can be modeled with moderate efforts, and the resulting MPC controller results in:

- improved control of quality parameters such as component concentrations, impurities, physical properties etc.
- explicit constraint handling, and production closer to the constraints.
- higher production capacity and lower energy consumption.
- higher regularity.
- a necessary control layer for implementation of "Real Time Optimization" (RTO) techniques.

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