An integrated software platform for the development and testing of multi-parametric controllers

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Framework for explicit/multi-parametric MPC

'High Fidelity' Dynamic Modeling

System Identification

Model Reduction Techniques

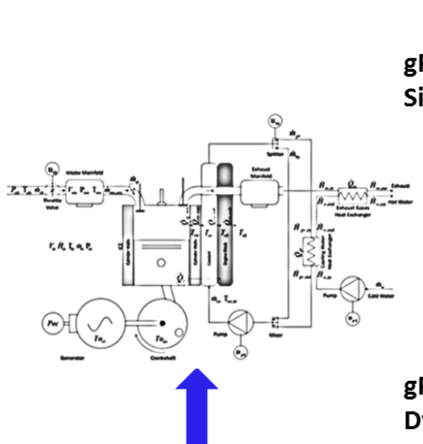
Approximate Model

Multi-parametric Programming

Parametric Controllers

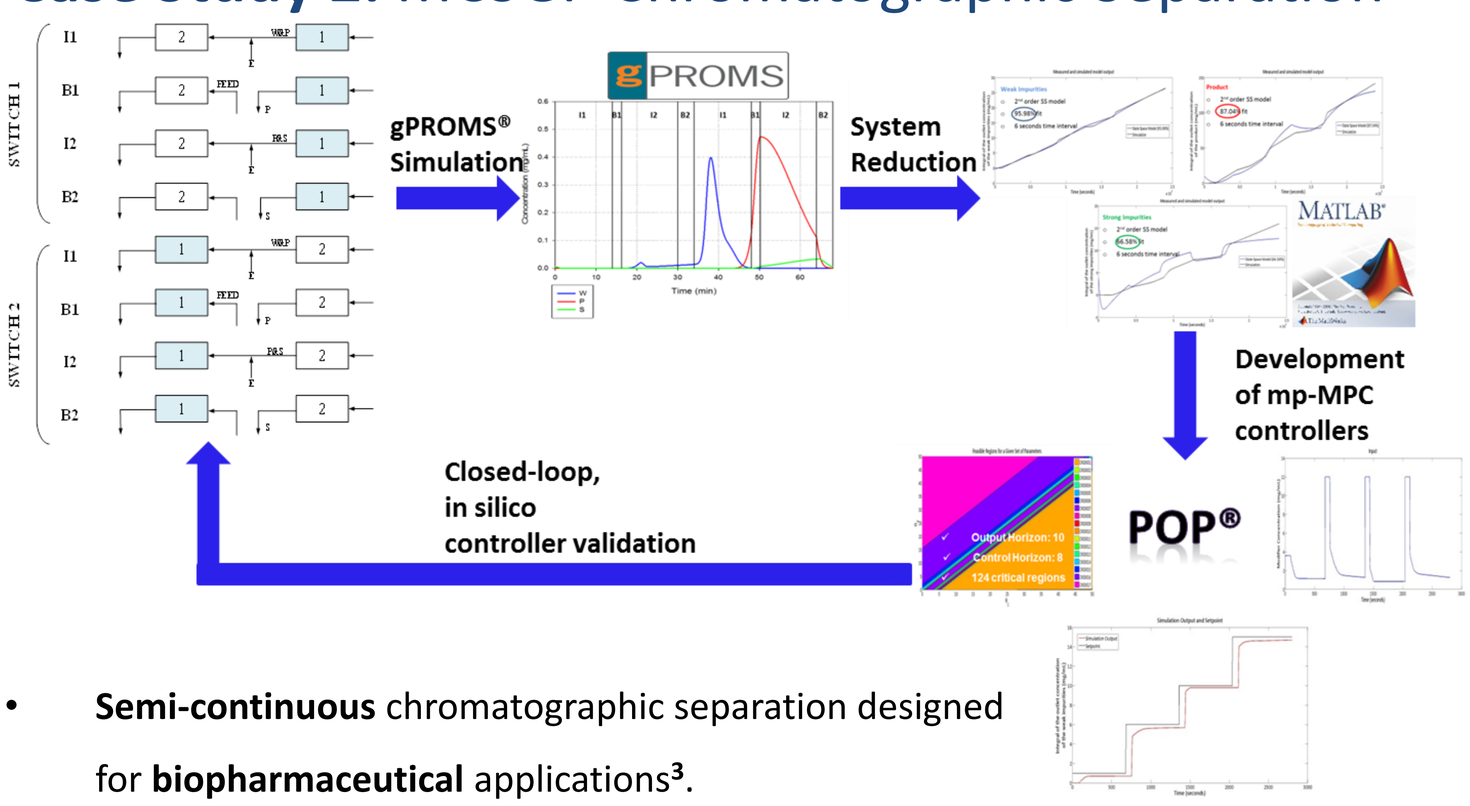
Closed Loop Control System Validation

Case Study 1: CHP Energy System



- **Cogeneration** of **heat** and **power** process model based on Guzella and Onder[2].
- **Dynamic Design Optimisation** in gPROMS®.
- **Explicit Model Predictive Control** for energy generation and heat recovery subsystems.

Case Study 2: MCSGP Chromatographic Separation



- **Semi-continuous** chromatographic separation designed for **biopharmaceutical** applications[3].
- **Periodic**, **nonlinear** system.
- Use of **software interoperability** for the controller development.
- Obtain high purity and yield under **continuous** operation.

References

[1] Pistikopoulos, E. N. 2009. Perspectives in multiparametric programming and explicit model predictive control. *AIChE Journal,* 55**,** 1918-1925.

[2] Guzzella, L. and Onder, C. H. (2010). *Introduction to Modeling and Control of Internal Combustion Engine Systems*. Springer, 2nd edition.

[3] Krättli, M., et al. (2013). "Online control of the twin-column countercurrent solvent gradient process for biochromatography." Journal of Chromatography A 1293(0): 51-59.