



Model Predictive Control for Slug Flow Suppression and Water Treatment in Daily Operations of Oil Field Facilities

Jørgensen, John Bagterp; Hørsholt, Steen; Zhang, Zhanhao; Ritschel, Tobias K.S.; Yang, Zhenyu; Jespersen, Stefan

Publication date:
2021

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Jørgensen, J. B., Hørsholt, S., Zhang, Z., Ritschel, T. K. S., Yang, Z., & Jespersen, S. (2021). *Model Predictive Control for Slug Flow Suppression and Water Treatment in Daily Operations of Oil Field Facilities*. Abstract from DHRTC Technology Conference 2021, Kolding, Denmark.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Model Predictive Control for Slug Flow Suppression and Water Treatment in Daily Operations of Oil Field Facilities

John Bagterp Jørgensen, Steen Hørsholt, Zhanhao Zhang, Tobias K. S. Ritschel, Zhenyu Yang, Stefan Jespersen

We develop a model predictive control (MPC) based advanced process control (APC) system for offshore oil and gas production processes that can significantly reduce oil concentration in discharged water while maintaining high oil and gas production. Using engineering domain knowledge, we model the flow line, the three-phase separator and the de-oiling hydrocyclones to simulate and control oil-in-water concentration in the produced water, while maximizing the oil and gas production. Figure 1 shows an illustration of the production system, from well to zero harmful discharge of produced water. We implement MPC technology for simultaneously stabilizing and optimizing the oil and gas production processes to maximize the oil production without violating legislative requirements of the discharged water. Novel sensors are combined with the APC system for monitoring oil-in-water concentration and providing data for modeling. The APC system will be tested using industry standard digital twins as well as in a pilot plant at Aalborg University in Esbjerg.

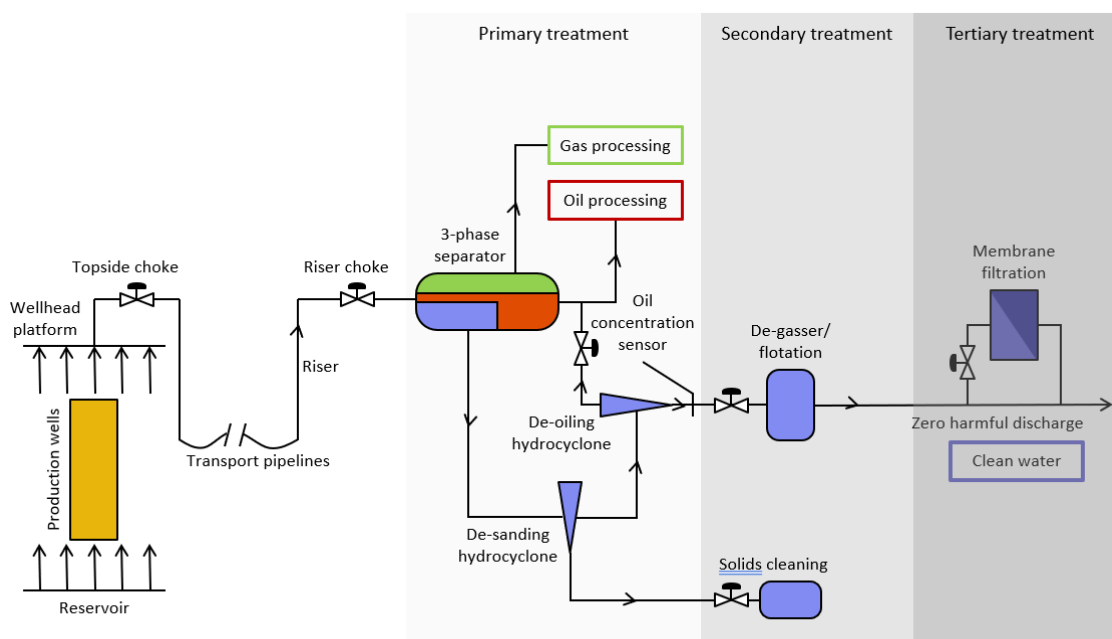


Figure 1: Units operations of offshore oil and gas production. The processes consists of a flow line and riser (where slug flow phenomenon can occur and cause large disturbances to the following separation processes), a 3-phase separator (oil, gas, water), de-oiling hydro-cyclones, de-gasser, and membrane filtration.