



Contribution ID: 9

Type: **Poster (+) Presentation**

Assessment of two hydraulic models of canal of Calais regarding the control issue

Wednesday, 2 June 2021 10:00 (1 hour)

Hydrographical systems which are mainly comprised of dams, rivers, channels, etc. are in the category of large-scale networks. These systems are not only complex systems in case of consisting of different hydraulic devices such as pumps or gates, but also they are in exposure to complicated circumstances like different demands, unknown inputs, drought periods, rainfall, and floods. Thus for answering the users' demands, assuring the demanded water levels and avoiding/limiting the probable flooding, applying a control strategy is of importance. Thanks to the recent advances in automation and computing science, there are several tools and methods to assist humans in case of the control issue. Additionally, another important item to be considered prior to control is the case of modeling and simulations. A hydraulic model can be used to estimate the unknown inputs and by having an accurate hydraulic model, it is possible to precisely determine the discharges and levels. Afterward, the hydraulic model is connected to software such as Matlab and the required codes so that the control strategies could be implemented and tuned. In the domain of water systems, model predictive control (MPC) has been widely used and received much attention and popularity due to the principle behind that, for applying the dynamic model of the system for predicting the impacts of the unknown inputs. MPC is also practical in the mentioned domain because of its ability to operate properly in the existence of constraints. MPC is compatible with various hydraulic models of the open-flow channels which basically work with Saint Venant equations and in this regard, considering the delay and attenuation in the wave propagation are crucial. In the matter of hydraulic modeling, there are some solutions such as SIC², Hydra, Mike11, SWMM, HEC-RAS, etc. Among these solutions which most of them can link to GIS (Geographic Information System), few of them are linked to Automatic software like Matlab. Based on simulation architectures, the objective of the presented paper is to define the main differences in the application of two software of SIC² and HEC-RAS in the real-data based simulation of the canal of Calais regarding using MPC for controlling over the canal.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

- Segovia, P., et al. "Model predictive control and moving horizon estimation for water level regulation in inland waterways." *Journal of Process Control* 76 (2019): 1-14.
- Duviella, Eric, et al. "Multi-scale modeling approaches of inland navigation networks for their management in a global change context." *Transport Research Arena, Paris La Défense, France* (2014).
- Ranjbar, R, et al. "Framework for a digital twin of the Canal of Calais." *Young Scientists Conference in Computational Science* (2020).

Acceptance of Terms and Conditions

[Click here to agree](#)

Newsletter

Primary authors: RANJBAR, Roza (PhD student); Prof. DUVIELLA, Eric (IMT-Lille-Douai); Dr ETIENNE, Lucien (IMT-Lille-Douai); Prof. MAESTRE, Jose Maria (University of Seville)

Presenter: RANJBAR, Roza (PhD student)

Session Classification: Poster +

Track Classification: (MS7) Mathematical and numerical methods for multi-scale multi-physics, non-linear coupled processes