

Niels Kjølstad Poulsen - Stochastic control theory



Often we are riding some white horses, but usually there is a dark horse involved - **uncertainty** .

In the modeling process, this often ends up with a grey box model with a white physical component and black stochastic component.

Base

Dynamics – Stochastics
Optimization – Estimation

Methodological track

- Modelling of dynamical (stochastic and deterministic) systems.
- Dynamic optimization. (non-quadratic index, non-linear dynamic, non-linear constraints).
- Control (including MPC) of systems influenced by stochastic disturbances and uncertainties.
- State estimation (filtering, prediction and smoothing). Kalman filter tuning.
- Monitoring and Fault diagnosis (detection, isolation and estimation) and fault tolerant control.
- System identification
 - Parameter estimation
 - Design of experiment
 - Structural estimation
- Adaptive control

Application track

- Modelling and control of wind turbines
- Energy systems, Winds parks, Smart grids.
- Rigid and flexible robots. Mobile robots
- Navigation and guidance. Localization and mapping.
- Process control. Spray drying, Silicon production.
- Biological systems (Diabetes modelling and control, Detection of deviant behaviour of dairy cows, Optimal feeding of fish (Lax))
- Urban drainage, Sewers, WWTP, Rivers and Fresh water systems.

Teaching track

- (02421) Stochastic adaptive control (Msc)
- (42111) Static and dynamic optimization (Msc)
- (02432) Stochastic simulation (Msc)
- (02904) Advanced system identification (PhD)
- (31323) Statistical fault detection (PhD)



Horns Rev II