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Darwish, M.A.H.; Toth, R.

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An on-line compensation of input additive disturbances: an evolving Gaussian process models approach

Mohamed A. H. Darwish† and Roland Tóth†

†CS Group, EE department, Eindhoven University of Technology, The Netherlands.

Case study: compensation of input additive disturbances for servo positioning system

Figure 1: Servo positioning system with mechanical friction brake that can be manually engaged. The additional mass can be added for the gravity compensation experiment.

\[ M(\dot{q}(t)) \ddot{q}(t) + F_0(\dot{q}(t), \dot{q}(t)) = u(t) \]

Known forces
First principles

\[ F_1(q(t), \dot{q}(t)) \]
Unknown disturbances
Nonlinear, time-varying
Data-driven modeling

How to compensate for disturbance, i.e., to estimate \( w(t) \)?

\[ u(t) = u_{\text{nom}}(t) + w(t). \]

Nonparametric regression, e.g., LLR or GPR
Efficient on-line learning

Efficient on-line learning of disturbances;
Selection of input/output regressors.

References

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