Economic MPC based on LPV model for thermostatically controlled loads - DTU Orbit (17/12/2018)

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Rapid increase of the renewable energy share in electricity production requires optimization and flexibility of the power consumption side. Thermostatically controlled loads (TCLs) have a large potential for regulation service provision. Economic model predictive control (MPC) is an advanced control method which can be used to synchronize the power consumption with undispachable renewable electricity production. Thermal behavior of TCLs can be described by linear models based on energy balance of the system. In some cases, parameters of the model may be time-varying. In this work, we present a modified economic MPC based on linear parameter-varying model. In particular, we provide an exact transformation from a standard economic MPC formulation to a linear program. We assume that the variables influencing the model parameters are known (predictable) for the prediction horizon of the controller. As a case study, we present control system that minimizes operational cost of swimming pool heating system, where parameters of the model depend on the weather forecast. Simulation results demonstrate that the proposed method is able to deal with this kind of systems.

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Contributors: Zemtsov, N., Hlava, J., Frantsuzova, G., Madsen, H., Junker, R. G., Jørgensen, J. B.
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