Economic MPC based on LPV model for thermostatically controlled loads - DTU Orbit (01/03/2019)

Economic MPC based on LPV model for thermostatically controlled loads

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.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Dynamical Systems, Scientific Computing, Technical University of Liberec, Novosibirsk State Technical University
Contributors: Zemtsov, N., Hlava, J., Frantsuzova, G., Madsen, H., Junker, R. G., Jørgensen, J. B.
Number of pages: 5
Publication date: 2017

Host publication information
Title of host publication: Proceedings of 2017 International Siberian Conference on Control and Communications (SIBCON)
Publisher: IEEE
ISBN (Print): 9781509010813
Keywords: Economic model predictive control, Linear time-varying model, Smart energy grid, Thermostatically controlled loads
DOIs: 10.1109/SIBCON.2017.7998560
Source: FindIt
Source-ID: 2372744332
Research output: Research - peer-review › Article in proceedings – Annual report year: 2017