Non-Cooperative Regulation Coordination Based on Game Theory for Wind Farm Clusters during Ramping Events - DTU Orbit (20/10/2019)

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With increasing penetration of wind power in power systems, it is important to track scheduled wind power output as much as possible during ramping events to ensure security of the system. In this paper, a non-cooperative coordination strategy based on the game theory is proposed for the regulation of wind farm clusters (WFCs) in order to track scheduled wind power of the WFC during ramping events. In the proposed strategy, a non-cooperative game is formulated and wind farms compete to provide regulation to the WFC during ramping events. A regulation revenue function is proposed to evaluate the competition process of wind farms to provide regulation to the WFC which includes revenue of effective regulation (ER), power support regulation and punishment regulation. The multi-time-interval Nash equilibrium condition is derived for the regulation competition process of wind farms. By setting parameters of the regulation revenue function according to the derived Nash equilibrium condition, the ER strategy is the Nash equilibrium of the regulation competition. Case studies were conducted with the power output data of wind farms from State Grid Jibei Electric Power Company Limited of China to demonstrate the efficacy of the proposed coordination strategy during ramping events.

General information
Publication status: Published
Organisations: Department of Electrical Engineering, Center for Electric Power and Energy, Electric Power Systems, Shandong University
Contributors: Qi, Y., Liu, Y., Wu, Q.
Number of pages: 11
Pages: 136-146
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Energy
Volume: 132
ISSN (Print): 0360-5442
Ratings:
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 5.6 SJR 1.99 SNIP 1.941
Web of Science (2017): Impact factor 4.968
Web of Science (2017): Indexed yes
Original language: English
Keywords: Competition process, Game theory, Nash equilibrium, Ramping events, Regulation revenue function, Wind farm cluster
Electronic versions:
Non_Cooperative_Ramping_Control_final.pdf. Embargo ended: 11/05/2019
DOIs:
10.1016/j.energy.2017.05.060
Source: PublicationPreSubmission
Source ID: 132054015
Research output: Contribution to journal › Journal article – Annual report year: 2017 › Research › peer-review