Spot Pricing When Lagrange Multipliers Are Not Unique

Classical spot pricing theory is based on multipliers of the primal problem of an optimal market dispatch, i.e., the solution of the dual problem. However, the dual problem of market dispatch may yield multiple solutions. In these circumstances, spot pricing or any standard pricing practice based on multipliers cannot generate a unique clearing price. Although such situations are rare, they can cause significant uncertainties and complexities in market dispatch. In practice, this situation is solved through simple empirical methods, which may cause additional operations or biased allocation. Based on a strict extension of the principles of spot pricing and surplus allocation, we propose a new pricing methodology that can yield unique, impartial, and robust solution. The new method has been analyzed and compared with other pricing approaches in accordance with spot pricing theory. Case studies support the results of the theoretical analysis, and further demonstrate that the method performs effectively in both uniform-pricing and nodalpricing markets.

General information
State: Published
Organisations: Electric Energy Systems, Department of Electrical Engineering, Shanghai Jiao Tong University, Hong Kong Polytechnic University, University of Hong Kong
Contributors: Feng, D., Xu, Z., Zhong, J., Østergaard, J.
Pages: 314 - 322
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: IEEE Transactions on Power Systems
Volume: 27
Issue number: 1
ISSN (Print): 0885-8950
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 6.58 SJR 2.742 SNIP 2.662
Web of Science (2017): Impact factor 5.255
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 8.17 SJR 3.368 SNIP 3.584
Web of Science (2016): Impact factor 5.68
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 6.6 SJR 3.315 SNIP 3.386
Web of Science (2015): Impact factor 3.342
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 5.31 SJR 2.475 SNIP 3.485
Web of Science (2014): Impact factor 2.814
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 6.33 SJR 2.523 SNIP 4.243
Web of Science (2013): Impact factor 3.53
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 5.84 SJR 1.941 SNIP 3.387
Web of Science (2012): Impact factor 2.921
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 5.34 SJR 1.586 SNIP 3.205
Web of Science (2011): Impact factor 2.678