PSERC Power Systems Engineering Research Center

# PSERC WEBINAR

## An Online Learning Approach to Algorithmic Bidding for Virtual Trading in Electricity Markets


**Lang Tong**
Cornell University



Price discrepancies between the day-ahead and real-time markets represent a form of market inefficiency. To promote price convergence between the two markets, virtual trading was introduced in the U.S. electricity markets in early 2000s that allows market participants to arbitrage on the differences between the day-ahead and real-time prices. Empirical and theoretical studies have shown that increased competition due to virtual trading results in a level of price convergence, thus improving market efficiency. Currently, cleared virtual transactions represent a significant fraction of total energy trade.

In this talk, we present an online learning approach to algorithmic bidding for virtual trading in a two-settlement market where there are a large number of trading options defined by the location and the time of trades. Without assuming specific parametric models of day-ahead and real-time prices, we develop an online learning algorithm that maximizes the cumulative return from the bidding strategy under both risk-neutral and risk-averse performance measures. We demonstrate that the proposed strategy outperforms existing machine learning benchmarks and achieves significant profit consistently based on historical data from the NYISO and PJM markets over the eleven-year period between 2006 and 2016.


---

**MARCH 27, 2018 | 2:00-3:00 P.M. EDT**

CONNECT.ASU.EDU/PSERC

(11:00-12:00 P.M. PDT)

---

Lang Tong is the Irwin and Joan Jacobs Professor of Engineering of Cornell University and the site director of Power Systems Engineering Research Center (PSERC) at Cornell University. His current research focuses on data analytics, optimization, and electricity markets in energy and power systems.

A Fellow of IEEE, Dr. Tong received the 1993 Outstanding Young Author Award from the IEEE Circuits and Systems Society, the 2004 best paper award from IEEE Signal Processing Society, and the 2004 Leonard G. Abraham Prize Paper Award from the IEEE Communications Society. He is also a coauthor of eight student paper awards. He is the 2018 Fulbright Distinguished Chair in Alternative Energy Technology.