数学与系统科学研究院

计算数学所学术报告

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报告题目：

A Robust Dynamic Algorithm to Provide Grid Services with a Fleet of Plug-In Electric Vehicles system

邀请人：　优化与应用研究中心

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Abstract:

Plug-In Electric Vehicles (PEVs) will be an integral part of the future smart grid. PEVs will have flexible charging options, and may be capable of transmitting electricity back to the grid (known as a vehicle-to-grid, or V2G, system). These features allow for a scheduling of PEV charging and discharging to reduce the electricity costs to consumers, while allowing utility companies to utilize a fleet of PEVs as distributed energy storage devices.

This work constructs an automated mechanism for a fleet of PEVs that efficiently organizes distributed electricity trading, while benefiting both the consumers and the utilities. The algorithm is based on a linear programming formulation on a relatively small amount of aggregated historical data. This static model of the fleet can be used to determine an hourly equilibrium price, which we use in a dynamic linear programming algorithm that allows a fleet aggregator to instantly and automatically determine satisfactory energy exchange schedules for tens of thousands of vehicles as they plug-in to the grid. The charging and discharging schedules are robust to unexpected events in both driving behavior and consumer electricity loads. Empirical results based on real driving behaviors, electricity pricing and electricity demand are shown.

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