

## 运筹学与信息科学研究所

Department of Operations Research and Information Science

# 学术报告

**题目:** Integrating EV Charging and Discharging into Power Grid Through Bilateral Negotiation

**报告人:** 林云峰 教授, 新加坡管理大学

**时间:** 4月1日(星期二) 10:00 - 11:30

**地点:** 数学院思源楼 S525

**摘要:** To deal with demand uncertainty on a power grid, a power plant with limited ramping capability can collaborate with an electric vehicle (EV) company. With proper charging and discharging prices, the EV company voluntarily withdraws electricity from or returns electricity to the power grid in suitable phases. We model the two parties' interactions as a bargaining game on the prices, followed by the EV company's charging and discharging problem and the power plant's electricity generation problem. To solve this bargaining game, we propose a novel "Guess and Verify" approach. Specifically, we first find an optimal solution within a restricted price set in which the two parties' total cost is minimized, and then verify its global optimality. Under an equilibrium contract, we find that the power plant can reduce its expected cost from the collaboration. This is because the EV company fully charges in a low electricity demand phase, reducing the power plant's curtailment cost, and fully discharges to the power grid in a high electricity demand phase, lowering the power plant's electricity generation cost. Based on real data, our numerical experiments suggest that the EV company's charging and discharging can substantially harmonize the power flow within the grid and save significant cost, especially when the electricity demand gap across different phases increases or the power plant's ramping capability decreases. Surprisingly, the EV company's percentage cost saving can exceed 100%, implying that it can make a profit from the collaboration. For the power plant, the percentage cost saving is 2-7%.

**报告人简介:** Yun Fong LIM is Professor of Operations Management at the Lee Kong Chian School of Business, Singapore Management University (SMU). He obtained both his PhD and MSc degrees in Industrial and Systems Engineering from the Georgia Institute of Technology. He has been a Chang Jiang Chair Professor, Lee Kong Chian Fellow, MPA Research Fellow, and NOL Fellow.