中美物流研究院青年学者系列讲座

2021 年第五讲

时间	报告人	报告题目
12:00-12：45	郑俊丽	智能制造技术在船舶建造过程中的应用情况
12:50-13：35	周利平	Integrated Multiresource Capacity Planning and Multitype Patient Scheduling
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时间：2021 年 5 月 18 日

地点：中院 301 教室

智能制造技术在船舶建造过程中的应用情况

报告人：郑俊丽 博士

时间：2021 年 5 月 18 日星期二 下午 12：00-12：45

地点:中院 301

摘要：随着国家智能制造战略和精益管理理念在造船领域的逐步推进，新兴技术与现代造船模式深度融合，对造船模式在展现形式和管理内涵上提出了更高的要求，促进企业从数字化、信息化、智能化角度深入考虑企业变革。虽有疫情冲击，2020 年度造船完工量、手持订单量、新承接订单量等造船行业三大指标均位居世界首位，步入造船大国第一梯队。

从造船大国到造船强国的转变，工信部组织制定了《船舶总装建造智能化标准体系建设指南》，指南的推行带动了企业着手实践“智能制造技术”的应用。报告从当前造船现状和船舶智能制造的特点出发，阐述了智能制造技术在船舶建造过程中的应用情况，结合工作实践和实际案例对船舶智能制造技术的具体实施做了简要说明。

报告人简介：郑俊丽，上海交通大学工业工程专业工学博士；先后于江苏熔盛重工有限公司、哈工大机器人集团、哈工大机器人（合肥）国际创新研究院就职。在造船经营战略、建造计划和现场实施等方面具有丰富的实战经验，曾参与 40 万吨 VLCC、317K VLOC、6500 箱集装箱船等船型的生产管理工作，负责过船舶分段车间调度系统、管材管附件集配管理系统等软件开发工作；具有包装行业智能制造产线规划、智能物流方案设计、MES 系统开发应用等项目

经历；带领团队开展上肢康复机器人、下肢步行训练器、智能上下肢机器人、助力步行器、康复教学系统等产品研发和成果转化工作。

先后荣获合肥市领军人才（创新）、江苏省企业优秀首席信息官等称号，参与科技部科技创新 2030-新一代“人工智能”重大专项、国家自然科学基金《面向船舶分段建造的资源受限空间动态调度方法》与《面向医疗服务的人机协同机制及人机系统管理决策优化研究》、等项目，发表学术论文 10 余篇，4 项发明、5 项实用新型，参与编写多项国家标准、行业标准和企业标准。

Integrated Multiresource Capacity Planning and Multitype Patient Scheduling

报告人：周利平 博士

时间： 2021 年 5 月 18 日星期二 下午 12：50-13：35

地点:中院 301

Abstract: The joint optimization problem of multiresource capacity planning and multitype patient scheduling under uncertain demands and random capacity consumption poses a significant challenge. The common practice in solving this problem is to first identify capacity levels and then determine patient scheduling decisions separately, which typically leads to suboptimal decisions that often result in ineffective outcomes of care. In order to overcome these inefficiencies, this paper proposes a two-stage stochastic optimization model that integrates these two decisions, which can lower costs by exploring the coupling relbetween patient scheduling and capacity configuration. The patient scheduling problem is modeled as a Markov decision process. We first analyze the properties for the multitype patient case under specific assumptions and then establish structural properties of the optimal scheduling policy for the one-type patient case. Based on these findings, we propose optimal solution algorithms to solve the joint optimization problem for this special case and propose a heuristic policy and a two-stage stochastic mixed-integer programming model solved by the Benders decomposition algorithm, which is further improved by combining an approximate linear program and the look-ahead strategy. The numerical results show that the joint optimization of capacity planning and patient scheduling could significantly improve the performance and our approaches yield good performances as measured by the gap against an upper bound.

报告人简介： 周利平，上海交通大学工学博士，上海交通大学博士后，美国普渡大学 Krannert 管理学院访问学者。研究方向为复杂生产与服务系统的运作管理，主要包括医疗健康服务系统的资源配置和患者调度，以及智能制造系统中的生产计划管理研究，在 INFORMS Journal on Computing、European Journal of

Operational Research、Omega、IEEE Transactions on Automation Science and Engineering 等国际期刊发表或录用学术论文 11 篇。2019 年入选上海市“超级博士后”激励计划和上海交通大学“晨星博士后”激励计划。

Data Center Network Design for Internet-Related Services and Cloud Computing

报告人：唐润宇

时间：2021 年 5 月 18 日星期二 下午 13：40-14：25

地点:中院 301

Abstract: Data center networks provide the physical infrastructure that hosts Internet-related services and cloud computing. Designing data center networks properly is imperative for Internet-related service and cloud computing providers to gain competitive edges through cost efficiency and service quality. In this paper, we formulate a mathematical programming model to address the data center network design problem, in which the objective is to minimize total operating cost and the service delay penalty by optimizing data center location, footprint allocation, and resource provisioning decisions, while incorporating essential features, such as latency, power, multiple resources, configuration limits, and interdependent footprints. We employ a queueing model to approximate the service latency and provide tractable reformulations. To enhance computational efficiency for large-scale problems, we further develop Lagrangian relaxation methods and generate strengthening cuts by exploiting the structural properties of the problem. Our numerical studies demonstrate that the proposed model, which jointly optimizes location, allocation, and resource provisioning, can achieve significant cost reductions and improvements in service quality compared with a hierarchical approach that optimizes these decisions sequentially. Moreover, our proposed solution methods outperform state-of-the-art commercial software in terms of computational efficiency. Based on real-world datasets, the proposed model selects data centers that have been chosen by major cloud computing infrastructure providers. We also draw managerial insights that can be used as design guidelines in practice.

报告人简介：唐润宇，清华大学在读博士，2017-2018 年于耶鲁大学联合培养。目前有多篇文章在国际一流期刊 OR, MS 在审，其中有一篇已被 Production and Operations Management 接受。研究主要关注新技术下的供应链管理，可持续供应链等等，主要研究领域包括鲁棒优化，整数优化等等。