

*The Hong Kong Polytechnic University*  
*Department of Logistics and Maritime Studies*  
*Research Seminar*

## **Schedule design for liner services under Vessel Speed Reduction Incentive Programs**

by

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**Date: 15 June 2018 (Friday)**  
**Time: 10:30am - 11:30am**  
**Venue: M802, Li Ka Shing Tower**  
**The Hong Kong Polytechnic University**

**(Conducted in English)**

### **Abstract:**

The gas and particulate emissions, including SO<sub>x</sub>, NO<sub>x</sub>, PM and CO<sub>2</sub>, from ship transportation are becoming increasingly prominent in recent years. In order to mitigate ship emissions near coastal areas, Port of Los Angeles (LA) adopts a voluntary Vessel Speed Reduction Incentive Program (VSRIP), which designs an upper speed limit for ocean-going vessels to slow their speeds as they approach or depart LA and offers financial incentives to the eligible vessel operators. Vessel Speed Reduction Programs (VSRPs) are also implemented at Port of Long Beach (LB), Port of San Diego (SD) and Port of New York and New Jersey (NY & NJ) with some differences in details.

This paper studies a schedule design problem of a liner shipping company under VSRIPs. A mixed-integer non-linear mathematical model on minimizing total costs, consisting of fuel cost and operating and capital cost minus dockage refunds, is proposed considering how to balance three determinants, i.e., the compliance of VSRIPs, the speed limit (the maximum physical speed of ships and the upper speed limit in VSRIPs), and the limited number of ships. An enumeration algorithm and a piecewise-linear approximation algorithm are developed based on some properties of the non-linear model. The effectiveness and efficiency of the proposed algorithms are validated by conducting numerical experiments.

### **Bio:**

Zhuge Dan received her Bachelor Degree in Accounting from Zhejiang Normal University (2014) and Master Degree in Management Science and Engineering from Shanghai University (2017). She is currently pursuing her Doctor of Philosophy under the supervision of Dr. WANG Shuaian (Hans). Her interested research areas include port logistics, shipping optimization and ship emission management.

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**All are welcome!**