

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

## **Managing Navigation Channel Traffic and Anchorage Area Utilization of a Container Port**

by

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**Time: 10:30am-11:30am**  
**Venue: M107, Li Ka Shing Tower**  
**The Hong Kong Polytechnic University**

**(Conducted in English)**

### **Abstract:**

Navigation channels are fairways where vessels receive official piloting services when traveling in and out of a container terminal basin. The availability of a navigation channel is affected by the tidal effect, in the sense that a vessel can pass through a navigation channel only when the water level in the navigation channel becomes deep enough. The limited capacity and availability of a navigation channel can lead to congestion in the terminal basin, causing uncontrolled execution of berth plans. A common practice for container terminals to mitigate congestion is to utilize some small anchorage areas in the terminal basin. By utilizing the small anchorage areas, incoming vessels can arrive at the terminal basin even before they are allowed to berth, and outgoing vessels can unberth even when the navigation channel is not available, which greatly facilitates the execution of the berth plans. In this paper, we optimize the navigation channel traffic and anchorage area utilization at a container port. We show that the problem is strongly NP-hard when all travel times satisfy the triangle inequality. We provide a mathematical formulation of the problem, and propose a Lagrangian relaxation algorithm for solving this formulation. We show that after relaxing the capacity constraint of the anchorages, this problem can be decomposed into two asymmetric assignment problems, which then can be solved in pseudo-polynomial time.

### **Bio:**

JIA Shuai is a PhD student at the Department of Logistics and Maritime Studies of The Hong Kong Polytechnic University. He obtained a master's degree and a bachelor's degree in logistics engineering from Shanghai Maritime University and Shandong Jiaotong University, respectively. Prior to commencing his PhD study, he worked for Shanghai International Port (Group) Co., Ltd. for three years as a software engineer and business analyst. His research interests include port operations management, maritime logistics, supply chain management, and combinatorial optimization. He is currently pursuing a PhD under the supervision of Prof. LI Chung-Lun and Dr. XU Zhou.

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**All are welcome!**