THE UNIVERSITY   **OF HONG KONG**

Department of Mathematics

Numerical Mathematics and Applied Analysis Group Seminar (NMAA)

June 23, 2010 (Wednesday)
Rm 309, Run Run Shaw Bldg., HKU

Ms. Choi Sin-Man
Department of Mathematics, HKU

Inducing Optimal Service Capacities via Performance-Based Allocation of Demand in a   Queueing System with Multiple Servers

2:00 – 2:30pm

Abstract: In this talk, we study the use of performance-based allocation of demand in a multiple-server queuing system. The same problem with two servers have been studied in the literature. Specifically, it has been proposed and proved that the linear allocation and mixed threshold allocation policies are, respectively, the optimal state-independent and state-dependent allocation policy in the two-server case.

The multiple-server linear allocation has also been shown to be the optimal state-independent policy with multiple servers. In our study, we focus on the use of a multiple-server mixed threshold allocation policy to replicate the demand allocation of a given state-independent policy to achieve a symmetric equilibrium with lower expected sojourn time.

Our results indicate that, for any given multiple-server state-independent policy that prohibits server overloading, there exists a multiple-server mixed threshold policy that gives the same demand allocation and thus have the same Nash equilibrium (if any). Moreover, such a policy can be designed so that the expected sojourn time at a symmetric equilibrium is minimized.

Therefore, our results concur with previous two-server results and affirm that a trade-off between incentives and efficiency need not exist in the case of multiple servers.

Ms. Huang Ximin
Department of Mathematics, HKU

On Improving Incentive in a Supply Chain: Wholesales Price Contract vs Quantity Dependent Contract

2:30 – 3:00pm

Abstract: In this talk, we study the performance of a supply chain consisting of one retailer and one supplier. The supplier sets the price scheme of some goods and the retailer then decides the order level and sells the goods in the market. Specifically, a quadratic cost function is assumed here to approximate the U-shape cost curve commonly observed in industries. Two kinds of contracts offered by the supplier are investigated, namely wholesale price contract and quantity dependent contract. Wholesale price is fixed under the first contract but varies depending on order level under the second one. We show that certain wholesale price contract successfully induces the retailer to order at a level such that supply chain profit is maximized, but extra cost in implementation may occur due to supplier's disagreement on this price. Given this, we propose an efficiency measure to show to what extent the wholesale price contract helps to increase supply chain profit. For quantity dependent contract, we show that it can coordinate the supply chain and leads to a proportional division of supply chain profit. We then generalize the analysis to cover the case of multiple retailers and single supplier where similar results are also obtained.

All are welcome