ANALYSIS OF THROUGHPUT IN QUEUEING NETWORKS WITH FINITE BUFFER AND BLOCKING

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ABSTRACT

Queueing networks with finite buffers have been widely used for modeling and analyzing many practical situation such as manufacturing systems, computer and communication systems. Models with finite buffers and exponential service times can be represented by finite state Markov chains. However, the number of states of the Markov chain increases drastically as the number of stages increases which makes numerical solutions intractable. Many approximation methods are presented for analysis of queueig networks with finite buffer. The approximation method s have been focused on the system with single server at each service stage and the literature on the analysis of the system with multiple servers and finite buffer at each stage is more scarce than the single server system.

In this talk, we present queueing networks with various network structures arising in manufacturing systems such as assembly, disassembly, split, merge, rework, parallel, feedforward and scrap. Approximation methods [1-3] recently developed for throughput in the system with multiple servers and finite buffer are proposed. We discuss the potential applications of the results to analyze the queueing network with complex combinations of network configurations.

[1] Y. W. Shin and D. H. Moon, Approximation of throughput in tandem queues with multiple servers and blocking, to be appeared in Applied Mathematical Modelling.

[2] Y. W. Shin and D. H. Moon, Throughput analysis of two-stage analysis of two-stage manufacturing systems with merge and blocking, to be appeared in Journal of Applied Mathematics and Informatics.

[3] Y. W. Shin and D. H. Moon, Analysis of multi-server two-stage queueing network with split and blocking, Proceedings of the 19th World Congress, The International Federation of Automatic Control, Cape Town, South Africa. August 24-29, 2014, pp. 1667-1671.