DYNAMIC SCHEDULING OF A $GI/GI/1+GI$ QUEUE WITH MULTIPLE CUSTOMER CLASSES

A. R. Ward, University of Southern California, USA, amyward@marshall.usc.edu
J. Kim, University of Southern California, USA, Jeunghyun.Kim.2015@marshall.usc.edu

We consider a dynamic control problem for a $GI/GI/1+GI$ queue with multiclass customers. The customer classes are distinguished by their inter-arrival time, service time, and abandonment time distributions. There is a cost $c_k > 0$ for every class k customer that abandons the queue before receiving service. The objective is to minimize average cost by dynamically choosing which customer class the server should next serve each time the server becomes available (and there are waiting customers from at least two classes).

It is not possible to solve this control problem exactly, and so we formulate an approximating Brownian control problem. The Brownian control problem incorporates the entire abandonment distribution of each customer class. We solve the Brownian control problem under the assumption that the abandonment distribution for each customer class has an increasing failure rate. We then interpret the solution to the Brownian control problem as a control for the original dynamic scheduling problem. Finally, we perform a simulation study to demonstrate the effectiveness of our proposed control.