ANALYSIS OF BUSY AND IDLE PERIODS IN APPOINTMENT-DRIVEN QUEUES WITH HETEROGENEOUS PATIENT CLASSES, GENERAL SERVICE TIMES, AND NO-SHOWS.

July 7th
Room E32
11:30
(p. 45)

Benedetto C. Valenti, William P. Millhiser

Effective appointment systems (AS) are one way for health care providers to improve their operational efficiencies for attaining financial viability and customer satisfaction. The underlying dilemma in AS design is the trade-off between patients wait times (resulting from tightly spaced intervals), and providers idle and consequent overtime (resulting from sparse intervals). Traditional literature has focused on cost-optimization models predicated on analysts ability to reliably assess patients waiting-time and providers idle-time costs, or at least estimate their relative ratio. We model patient waiting times and doctor idle/overtime as a stochastic process and analyze AS in terms of their probability of exceeding stated targets. Our model incorporates service time variability with general distributions, no-shows and heterogeneous populations, and analysis of existing AS rules advocates a paradigm shift in AS design, driven by service-level policy considerations. Current model capabilities enable future research in designing such policy-constrained AS.

STABILITY ANALYSIS FOR FLUID LIMIT MODELS OF MULTICLASS QUEUEING NETWORKS

July 7th
Room E36
10:30
(p. 45)

Erjen Lefeber, Dieter Armbruster, Yoni Nazarathy

It is well known (Dai, 1995) that if the fluid limit model of a work conserving queueing discipline is stable, then the associated queueing network is positive Harris recurrent. We consider work conserving queueing disciplines where service of a class can be prohibited depending on the (non)presence of customers of certain classes. For these disciplines, including priority disciplines, we present a graph based algorithm which determines stability of the fluid limit model.
In general, fluid solutions are not unique. Whenever the fluid limit model contains both stable and unstable solutions, as e.g. in the example presented in (Dai, Hasenbein, Vande Vate, 2004), the algorithm also provides a way to modify the priority discipline (on a set of measure zero) such that the unstable solutions are eliminated from the fluid limit model, rendering the associated queueing network positive Harris recurrent.

NEARLY PERIODIC BEHAVIOR IN THE OVERLOADED MANY-SERVER $GI/D/S+GI$ QUEUE

July 7th
Room E36
11:00
(p. 45)

Yunan Liu, Ward Whitt

Queueing systems with deterministic service times are of applied interest because computer-generated service times, such as automated messages, may well be deterministic, and computer-generated service is becoming more prevalent. We consider a $GI/D/s+GI$ queueing model with a general arrival process (the first GI), deterministic service times (the D), multiple servers (the s), and general abandonment times (the last GI). Under general conditions, the number of customers in this $GI/D/s+GI$ many-server queue at time t converges to a unique stationary distribution as $t \to \infty$.