



Trimming Taxiing Time

It's hard to choose which part of air travel is the most fun—body scans, removing your shoes, fighting for the armrest, middle seats—but waiting on the runway is a worthy candidate. Controllers often let jets leave the gate when ready, regardless of existing runway lines, which can lead to long waits. Mathematical models that rely on probability and dynamic programming estimate travel time to the runway and wait time on the runway, allowing controllers to see the effect that the different options open to them have on flights' departure times. In tests at different airports the models have demonstrated the ability to shorten runway wait times, which reduces congestion and saves tons of fuel.

The models are very accurate: always predicting the number of aircraft in runway queues to within two. And despite their complexity (they involve many variables, such as weather conditions and runway configuration), the models also are very quick: controllers can get real-time updates on anticipated queues every 15 minutes. The models aren't yet in use everywhere, but they may be soon because with an air system that is expected to be stretched to capacity in about five years, analysts say that managing departures is a good way to improve airport and airline efficiency.

For More Information: "A Queuing Model of the Airport Departure Process," *Transportation Science*, Ioannis Simaiakis and Hamsa Balakrishnan, Vol. 50, No. 1 (2015).



Listen Up!



MM/124



The **Mathematical Moments** program promotes appreciation and understanding of the role mathematics plays in science, nature, technology, and human culture.

www.ams.org/mathmoments