The One-Dimensional Dynamic Dispatch Waves Problem

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ABSTRACT

We study same-day delivery distribution systems by formulating the Dynamic Dispatch Waves Problem (DDWP), which models a depot where delivery requests arrive dynamically throughout a service day. At any dispatch epoch (wave), the information available to the decision maker is (1) a set of known, open requests which remain unfulfilled, and (2) a set of potential requests that may arrive later in the service day; the decision maker decides whether or not to dispatch a vehicle at each wave, and if so, which subset of open requests to serve, with the objective of minimizing expected vehicle operating costs and penalties for unserved requests. We consider the DDWP with a single delivery vehicle and request destinations on a line: We describe a class of a priori dispatch policies that plan routes for each wave in advance, and provide a dynamic programming approach for determining an optimal policy of this kind. We then discuss the benefits of dynamic policies, and propose several bounds and heuristics for the dynamic case.

Joint work with Alan Erera and Mathias Klapp
Alejandro Toriello joined Georgia Tech ISyE in August 2013 as an assistant professor. His research interests lie in the theory and application of supply chain management, logistics and transportation, and in related optimization methodologies. He currently serves as associate editor for the journals *Optimization Methods and Software* and *Transportation Science*. Prior to joining ISyE, he served as an assistant professor in the Epstein Department of Industrial and Systems Engineering at the University of Southern California.