

Colloquium

“Vehicle Routing Problem with Interdiction”

Who:	Dr. Kai Huang Area of Operations Management DeGroote School of Business McMaster University
When:	Thursday April 19, 2018 3:00 P.M.
Where:	Room 9-118, Lambton Tower Father Faught Conference Room

Abstract

In this research, we study the role of disruptions in the multi-period Vehicle Routing Problem (VRP), which naturally arises in humanitarian logistics and military applications. We assume that at any time during the delivery phase, each vehicle could have a chance to be disrupted. When a disruption happens, vehicles will be unable to continue their journey and supplies will be unable to be delivered. We model the occurrence of disruption as a given probability and consider the multi-period expected delivery. Our objective is to minimize the total travel cost or to maximize the demand fulfillment, depending on the supply quantity. This problem is called the Multi-Period Vehicle Routing Problem with Disruptions (VRPMD). VRPMD does not deal with disruptions in real-time and is more focused on the long term performance of a single routing plan. We first prove that the proposed VRPMD problems are NP-hard. Then we show some analytical properties pertaining to the optimal solutions of these problems. We show that the Dror and Trudeau's property does not hold in our problem setting. Nevertheless, a generalization of the Dror and Trudeau's property holds. Finally, we present efficient heuristic algorithms to solve these problems and show the effectiveness of the proposed models and algorithms through numerical studies.

Biography:

Dr. Huang specializes in the optimization under uncertainty and data-driven optimization techniques with applications in business analytics and supply chain management. His recent research interests include electric vehicles, data-driven inventory management, humanitarian logistics, and closed-loop supply chains.