MAP03

Stochastic Emergency Port Selection

Lennon Conson, Brian Lunday
Air Force Institute of Technology, Wright-Patterson AFB, Ohio, USA

Abstract

The United States Government (USG) maintains stockpiles rolling stock distributed across its territory. For emergencies requiring these resources, the rolling stock is transported by rail to seaports of embarkation (SPOE), where it is loaded onto USG-controlled ships for delivery to final destinations. This research presents a two-stage stochastic transshipment model to identify a limited number of SPOEs to utilize and to route and schedule rolling stock when the transportation times between locations are stochastic. Unlike traditional commercial transshipment models that primarily aim to reduce costs, this research focuses on optimizing the scheduling of roll-on/roll-off (RORO) cargo for emergency situations. Key challenges include a limit on the number of SPOEs utilized, scheduling routing of USG controlled RORO ships, coordinating incoming train schedules with SPOE processing limits, and ensuring ships' cargo capacities are not exceeded. The stochastic programming model presented herein is a two-stage mixed-integer program. For a representative instance, this work parameterizes the model for multiple, equiprobable scenarios using the sample average approximation and solves the instance using the L-Shaped Method.

Conference Track

Military Applications