ABSTRACT

A Multi-Objective Decision Support Model for Maintenance and Repair Strategies in Bridge Networks

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Over the last decade, bridge management systems (BMS) have been developed to assess strategies for maintenance and repair of bridges with the aim of minimizing cost while prolonging life. Generally, these systems have dealt with management of individual bridges or projects within a network rather than treating the network as a whole. In this work, a computational model is developed to aid in identifying optimal strategies for maintenance and repair of a bridge network with the threefold objectives of maximizing bridge service life, minimizing maintenance and repair costs, and minimizing user travel time delay. These three objectives are not expressed by linear equations nor are they in analytical form. A genetic algorithm is employed to search the multi-objective space for optimal solutions. A quantitative aid for managerial decision-making in selecting among the competing optimal strategies so obtained is suggested. Results are explored for several idealized networks and for two actual NYC bridge networks.