

多疫区多周期应急物资协同优化调度

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Optimal multi-period collaborative scheduling of emergency materials for multiple epidemic areas

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摘要 针对突发公共卫生事件应急管理体系中应急物资需求的不确定性和连续性以及应急救援是一个同时在多疫区间展开的多周期救援过程这一实际, 提出了多疫区多周期应急物资协同优化调度方案. 首先在分析传染病扩散规律的基础上, 结合传染病潜伏期的不确定性所引起的应急救援的时滞性, 采用纵向配送和横向转运相结合的协同配送模式, 构建了一类应急物流网络优化多目标随机规划模型; 其次采用遗传算法给出了该优化模型的求解算法; 最后通过仿真算例验证了模型及算法的有效性和可行性.

关键词: 应急物流 传染病扩散模型 协同优化 随机规划 遗传算法

Abstract: Since demand of emergency materials is usually uncertain and continuous and the emergency rescue proceeding which is consist of more than one period always takes place in multiple epidemic areas at the same time, an optimal multi-period collaborative scheduling of emergency materials for multiple epidemic areas is proposed. Firstly, with the consideration of the delay caused by the latent period of an epidemic and the collaborative strategy based on vertical distribution and transverse transportation, a multi-objective stochastic programming model for an emergency logistics network is constructed based on the epidemic diffusion rules. Then the genetic algorithm is adopted to solve the optimization model. Finally, the application of the model is given by a numerical example.

Key words: emergency logistics SEIR model collaborative optimization stochastic programming genetic algorithm

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