A Model for Helicopter Routing Problem

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Abstract : Helicopter routing problem (HRP) is finding good tours for helicopter so as to pick up and deliver personnel or material among specified nodes, mutually. It can be encountered in case of being lots of supply and demand points for different commodities and requiring delivering commodities with helicopter. For instance, to deliver personnel or material from shore to oil rig is a good example. In fact, HRP is a branch of vehicle routing problem with pickup and delivery (VRPPD). However, it has additional constraints such that fuel capacity, performance of helicopter in different altitude and temperature, and the number of maximum takeoff and landing allowed. This kind of pickup and delivery problems can be classified into 3 groups, basically. 1-1 (one to one), M-M (many to many) and 1-M-1 (one to many to one). 1-1 means each commodity has only one supply and one demand point. M-M means there can be more than one supply and demand points for each kind of commodity. 1-M-1 means commodities at depot are delivered to demand points and commodities at customers are delivered to depot. In this case helicopter takes off from its own base, complete its tour and return to its own base. In this study, we define 1-M-M-1 type HRP. That means helicopter takes off from its home base, deliver commodities among the nodes as well as between depot and customers and return to its home base. These problems have NP-hard nature. Therefore, obtaining a good solution in a reasonable time is not easy. In this study, a model is offered for 1-M-M-1 type HRP. It is shown on small scale test instances that the model can find the optimal solution.

Keywords : helicopter routing problem, vehicle routing with pickup and delivery, integer programming

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