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Optimization of Maritime Container-Transportation Network Through the Use of Genetic Algorithm

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Summary: Recently, the amount of international maritime container-cargo movement has seen a dramatic increase, especially in East Asia. In response, shipping companies have formed strategic alliances and have attempted to upgrade their service to attract more cargo. As well, very large container ships have been introduced and voyage routes have been optimized to improve transportation efficiency. In this study, a Genetic Algorithm (GA) is applied to develop a design method to further optimize the maritime container-cargo network. In this method, not only the sea routes of the container ships but also detailed information regarding cargo flow, such as which cargo is transshipped to which ship at which port, etc., is considered. Thus, an effective design of the transportation network can be achieved. From a case study in which the scale of the cargo volume for a virtual alliance was assumed, a pendulum route between Europe and East Asia was obtained as an optimum solution. Also, another case study, in which the value reduction of the cargo due to the increase of transit time is considered, showed that direct voyage routes, by which the minimum transit time and no transship are realized, are effective. These results provide very useful information to the stakeholders of maritime transportation.

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