Network Design Models for Container Shipping

This paper presents a study of the network design problem in container shipping. The paper combines the network design and fleet assignment problem into a mixed integer linear programming model minimizing the overall cost. The major contributions of this paper is that the time of a vessel route is included in the calculation of the capacity and that an inhomogeneous fleet is modeled. The model also includes the cost of transshipment which is one of the major cost for the shipping companies. The concept of pseudo simple routes is introduced to expand the set of feasible routes. The linearization of the presented non-linear model is covered in detail. Computational experiments are performed to show the correctness of the model.