Green liner shipping with optimization

It is estimated that 90% of global trade is carried via the sea, and shipping is by far the most energy-efficient way of transportation. However, the shipping industry is responsible for 2.2% of the global CO2 emission, and an even larger emission of SOx, NOx and particles. Therefore, still more regulations are imposed on the emission, making it difficult for liner shipping companies to plan their operation.

In this talk we will address two important problems: Speed optimization and bunker planning.

Speed optimization of a complete liner shipping network makes it possible to generate a schedule of all vessels that minimizes fuel costs while maintaining short transportation times. The bunker planning problem optimizes where and when to purchase fuel for a fleet of vessels, taking into account fluctuating prices at different locations. A unified model has been developed making it possible to plan bunkering for all vessels of a large shipping company up to one year in advance.

Results from real-life cases will be presented and it will be discussed how they can be used for strategic, tactical and operational planning. The talk is concluded by discussing future challenges within maritime shipping and the LINERLIB set of public benchmark instances.

Keywords: Speed optimization, Inventory models, Dantzig-Wolfe decomposition.