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Liner Shipping Service Scheduling with Workshift Costs

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Line Reinhardt

Container shipping companies are currently facing combined challenges of overcapacity and volatile fuel prices. In addition, rising concerns about greenhouse gas emissions has made it crucial for shipping companies to reduce their fuel consumption. The consumption of fuel for shipping vessel is polynomially proportional to the speed. This study proposes a new model which for a fixed liner shipping network, minimizes the fuel consumption by adjusting the port berth times to allow for a more even speed throughout the service and thus a lower overall fuel consumption. This speed optimization is done while ensuring that given transit time limits for the carried cargo is satisfied, and considering the layover time for containers transshipping between services. Workshift times and cost are included ensuring that changing the port visit time will not introduce an addition cost for the port operations. The model gives the global optimal solution for an entire network of container liner services and penalties for moving the port time is introduced to avoid the cumbersome work of changing port visit times when only negligible savings can be achieved. Preliminary results applying the model on real size liner shipping networks is presented.