Robust Supply Vessel Planning with Heuristics

Yauheni Kisialiou*†[1] and Irina Gribkovskaia‡[1]

[1]Molde University College – Britvegen 2, 6410 Molde, Norway

Abstract

Supply vessel planning problem arises in the upstream offshore oil and gas logistics, where supply vessels are the most expensive logistics resource. A fleet of supply vessels provides delivery of necessary materials and equipment to a set of offshore installations on a periodic basis from an onshore supply base. The problem itself involves scheduling, routing and packing decisions. The objective is to define an optimal fleet composition and a least-cost weekly sailing plan of scheduled vessels' voyages used repetitively over a season. Oil and gas operators require reliable and continuous service since the downtime of an installation is too costly. The challenge is that the service of installations in the winter season is affected by uncertain weather conditions, which influence vessels sailing and service times leading to delays and impossibilities to provide service as planned. Therefore, planners create vessel schedules with sufficient robustness against weather uncertainty to avoid frequent use of extra vessels. Robustness in practice is achieved by increasing the duration of voyages. In our study, we present and compare several known methodologies for construction of robust supply vessel schedules, and consider new approaches for incorporating robustness into a weekly sailing plan during its generation with heuristics. While previous research dedicated to robust supply vessel planning deals with problems of small and medium size, we develop a heuristic algorithm able to provide robust schedules for realistic large size problems.

*Speaker

†Corresponding author: yauheni.kisialiou@himolde.no

‡Corresponding author: Irina.Gribkovskaia@hiMolde.no