

ABSTRACT

This thesis explores weather routing systems and their application in both commercial shipping and the sailing world. The aim is to provide insight into how these complex systems operate, what methods and algorithms they use, and which meteorological factors influence them.

Weather routing systems are designed to determine the optimal route for ships based on weather forecasts and ship characteristics. There are two main methods: the deterministic method, which uses mathematical models to predict specific weather conditions, and the probabilistic method, which applies statistical techniques to calculate the probability of various weather conditions.

In addition, important meteorological elements such as wind, precipitation, tides, and currents are covered in detail. The influence of these factors on ship performance and safety is highlighted, for example, the way in which wind direction and speed affect sailing time and fuel consumption, and how precipitation can reduce a ship's visibility and stability.

The thesis also discusses various weather models, both global and regional. Global weather models such as ECMWF and GFS provide broad weather forecasts, while regional models such as HIRLAM and ALADIN are more specific and detailed for areas.

Weather routing systems are essential to modern shipping and yachting. They improve safety and efficiency by determining optimal routes based on current and forecast conditions. Thanks to technological advances such as accurate weather models and advanced algorithms, these systems are increasingly reliable and effective.

