Modelling of ship maneuverability and trajectory by data analysis

Background and motivation

More than 60% of maritime accidents are attributed to human related operations. Furthermore, due to lack of capability for master mariners to continuously adjust a ship's operation profiles (speed, course), ships are not navigated in an energy efficient manner, leading to large waste of fuel cost and emissions. As the fast development of smart functions for maritime transport (in particular mature autopilot system is already available to navigate a ship to follow a predefined course during most of her sailing time in open calm sea), autonomous shipping is getting great attentions from different maritime stakeholders. It could provide more energy efficiency, safe and environmentally friendly shipping.

The 3-meter unmanned ship model that will be used in this thesis

Objectives and goals

One of the most urgent challenge for autonomous shipping is to avoid collisions with "obstacles (other ships)" surrounding the ships, and then plan real-time routes for the unmanned ship to follow. To fulfil these requirements, it is essential to know the ship's maneuverability and predict her sailing trajectories. At Chalmers Marine Technology, we have equipped two unmanned vessels to develop solutions for some key technical challenges within the autonomous shipping project. This project aims at developing methods to automatically build and update a ship's maneuverability model, as well as predict a ship's near future sailing trajectories using test data on this unmanned ship model.

Methods and tools

We will provide you some already existed python codes, which can process the data and model a ship's maneuverability in a generic format. You need to first understand the python codes, analyze the ship maneuverability test data, and conduct the tests by yourself to collect data. Eventually, investigate and compare various models for the prediction of ship sailing trajectories.

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