Adaptive and Self-tuning Control Strategies for Dynamic Positioning of Marine Crafts

Project description

Dynamic positioning (DP) is a technology used to maintain the position and heading of a vessel, rig, or other marine structure, without the need for anchors or mooring lines, in both calm and harsh weather conditions. A DP system uses propulsion devices such as propeller and thrusters along with sensors to continuously adjust the vessel's position and heading in response to changing wind, current and wave conditions.

A DP system is comprised of various subsystems, including a thrust allocation unit and a closed-loop control system. One of the objectives of the control-loop is to produce inputs to the thrust allocation unit, such that adequate force is produced to maintain a position or move towards a new desired set position. Such a control system is typically, laboriously, developed and tuned on a vessel-to-vessel basis. As a remedy, this project seeks to explore adaptive and self-tuning control methodologies and other control strategies that allow for the development of a generalised DP system.

We are seeking a highly motivated control engineering student, who wishes to conduct their master thesis work in collaboration with a company. Your skills and interest should primarily lie within the realm of mathematical modelling, linear and nonlinear control theory and development using MATLAB/Simulink.

The company can provide project supervision, access to industry experts within marine operations and technologies, as well as access to a high-fidelity simulator.

Who are we?

EMRI has provided steering control, heading control (autopilots) and dynamic positioning (DP) systems for everything from the largest cruise liners to the most exclusive mega-yachts for the last 50 years – with focus on extreme precision and durability. In 2020, Furuno acquired EMRI to add autopilot and dynamic positioning technologies to its market-leading portfolio of maritime navigation, communication, and acoustic systems. We are on a mission as part of the Furuno corporation to provide control solutions for next-generation ships capable of making autonomous decisions to increase safety requirements, reduce CO2 emissions, and mitigate a global shortage of skilled ship crew.

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