

Tutorial 8: Geophysical Navigation of autonomous vehicles.

Abstract

This tutorial covers fundamental and applied topics on Geophysical Navigation of autonomous vehicles, with particular emphasis put on applications to the navigation of autonomous underwater vehicles (AUVs). The presentation approach proposed relies mainly on the application of methods to the solution of currently open problems that are not covered in the literature or whose experimental implementation is not documented. A strong emphasis is put on the solution of practical problems that require considerable theoretical and practical expertise. Within this approach, special attention is given to the challenging problem of magnetic navigation and tracking of underwater vehicles.

The theoretical matters included in the presentation will be addressed shortly with the sole purpose of introducing the unfamiliarized attendees to the topics while simultaneously providing a very brief review of the knowledge background required for the understanding of the exposition. A series of fundamental bibliographic references covering those matters will be provided. The theoretical topics will be illustrated with practical examples and its relevance will be demonstrated through the series of real experiments included in the tutorial.

The attendees will be able to analyze, modify, and parametrize a series of fully functional algorithms implemented in Matlab whose code will be made available.

The concepts, the actual implementations, and the practical hints made available to the audience are expected to help the participants to transition from theory to practice, thus fostering the application of geophysical navigation methods in the field of marine robotic navigation.