



Seminar

Systems and Control Group - CIDMA

17 de novembro de 2021, 14h00

Departamento de Matemática, Universidade de Aveiro
Sala Sousa Pinto

The Historical Zermelo Navigation Problem of Quickest Nautical Revisited in the Frame of Geometric Optimal Control

Bernard Bonnard

Institut Mathématiques de Bourgogne and Inria Sophia Antipolis, France
bernard.bonnard@u-bourgogne.fr

Abstract

One founding problem of calculus of variations set by Carathéodory-Zermelo of quickest nautical path of a ship navigating between two shores of a river is set in the frame of geometric optimal control. The explicit computation of the geodesics solutions of the Maximum Principle using the heading angle of the ship is interpreted using the Goh transformation and Clairaut condition is related to control computation. The role of limits curves is shown to correspond to abnormal geodesics in optimal control. The time minimal synthesis obtained by the historical contributors is presented in a more modern geometric setting using Hamiltonian dynamics singularity analysis and conjugate point computations.

This seminar was supported in part by the Portuguese Foundation for Science and Technology (FCT – Fundação para a Ciência e a Tecnologia), through CIDMA - Center for Research and Development in Mathematics and Applications, within project UIDB/04106/2020.