First Joint Meeting Brazil Italy of Mathematics
Special Session: Optimal Control

Rio de Janeiro, August 29 - September 02, 2016

Title: Analytical and Numerical Study of Optimal Path Planing Problem for Autonomous Underwater Vehicles (AUV)

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Abstract: We consider a simplified model for the problem of planning the path of AUV to go from one point to a target set in the minimum time on a horizontal plane of constant depth. We take into consideration velocity of ocean currents with components merely on one coordinates of the position of the vehicle but depending on the other, and, moreover, we couple the kinetic equations with a dynamic equation relating the velocity with the thrusters force. Our problem includes state constraints since the velocity of the vehicle is bounded. We treat the problem numerically using the direct method and the optimization software package IPOPTS. As an interface with IPOPTS we use both AMPL and ICLOCS . A special feature of our work is the validation of the numerical solution via a maximum principle we derive from [1].

[1] R. B. Vinter, Optimal Control, Birkhauser, 2000.