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Visualization Strategies for Optimal 3D Time-Energy Trajectory Planning for AUVs using Ocean General Circulation Models

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In this presentation, we discuss visualization strategies for optimal time and energy trajectory planning problems for Autonomous Underwater Vehicles (AUVs) in transient 3D ocean currents. Realistic forecasts using an Ocean General Circulation Model (OGCM) are used to define time and energy optimal AUV trajectory problems in 2D and 3D. The visualization goal is to explore and explain the trajectory the AUV follows, especially how it exploits both the vertical structure of the current field as well as its unsteadiness to minimize travel time and energy consumption. We present our choice of visualization tools for this purpose and discuss shortcomings and possible improvements, especially for challenging scenarios involving 3D time-dependent flow and realistic bathymetry.