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Optimal Path Planning of an Autonomous Underwater Vehicle in a Sea Current Field

Koichiro Shiraishi and Hajime Kimura

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Summary: Path planning of an autonomous underwater vehicle is one of the most important problems to reduce energy consumption and to navigate safely.Since there exists more or less sea current in most of underwater environments, a current disturbance becomes resistance and a factor to increase the energy consumption according to a direction of motion of AUV.Thus path planning considering a sea current field make possible an improvement of energy consumption.In this paper, optimal path planning considering energy consumption for AUV is formulated as a shortest path problem in Graph Theory.Solution of the formulated problem is obtained by Dijkstra's Algorithm which is an algorithm to find the shortest paths in a weighted, directed graph.The effectiveness of the proposed method is verified through numerical simulation in several current fields with obstacles.Furthermore, authors propose a triangular panel interpolation method for the purpose of applying this technique to measurement data of sea current fields.The method uses the Delaunay Triangulation to generate triangular panels from data points scattered at random.Then sea current data at an arbitrary point are interpolated using triangular panels generated.

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