

**On Finding the Location of an Underwater Mobile
Robot
Using Optimization Techniques**

by

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(ABSTRACT)

This research aims at solving an engineering design problem encountered in the field of robotics using mathematical programming techniques. The problem addressed is an indispensable part of designing the operation of Ursula, an underwater mobile robot, and involves finding its location as it moves along the circumference of a nuclear reactor vessel. The study has been conducted with an intent to aid a laser based global positioning system to make this determination.

The physical nature of this problem enables it to be conceptualized as a position and orientation determination problem. Ursula tests the weldments in the reactor vessel, and its position and orientation needs to be found continuously in real-time. The kinematic errors in the setup and the use of a laser based positioning system distinguish this from traditional position and orientation determination problems. The aim of this research effort is to construct a suitable representative mathematical model for this problem, and to design and compare various solution methodologies that are computationally competitive, numerically stable, and accurate.

Dedicated

To my advisor Dr. Sherali and my supervisor Dr. Beaton

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