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| **Problem Chosen** ABCDEF | **2024 MCM/ICM Summary Sheet** | **Team Control Number** 2410605 |

Summary Sheet

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1. **Introduction**
   1. **Problem Background**

Modern people's understanding of the ocean, especially the deep sea, is far less than that of the land. Deep-sea exploration is to comprehensively study the mysteries of the ocean and the earth, exploring the natural conditions of the deep ocean, such as the appearance of the seabed, ocean currents, as well as the biological and economic resources contained in the seabed. The deep sea space has complex and special environmental characteristics, its sea surface Marine meteorology and sea water movement are changeable, and the sea bottom has no light, high pressure, low temperature and no oxygen. The severe Marine environment, equipment failure, human factors and other factors make the deep sea major sudden safety accidents hover at a high level for a long time. In order to reduce the loss of deep-sea accident and find out the cause of the accident, it is necessary to carry out rescue and search and salvage the accident equipment at the first time

* 1. **Restatement of the Problem**

According to the requirements of MCMS, we are supposed to support their submersible safety system in the following aspects

* Develop a model to predict the position of the submersible over time. Through the analysis of uncertain factors, consider the auxiliary positioning information and the corresponding acquisition equipment
* Under the premise of considering economy and practicality, adding additional search equipment to the main vessel and the rescue vessel
* By using the information in the positioning model, recommend the initial deployment point and search mode of the equipment in order to minimize the search time, and determine the probability of finding the submersible based on the time and cumulative search results.
* Extend the model to different marine environment and the environment with identified disturbances
  1. **Our work**

1. **Assumptions and Justification**
2. **Notations**
3. **Model I: Submersible Location Prediction Model**
   1. **Submersible configuration**

In order to simplify the model, through data search and comparison, we set the submersible as a capsule-like shape, and the specific structure is shown in the figure below：

* 1. **State of the Ionian Sea**

Data 收集 三线表

Currents（方向&大小 0.008）

Sea Water Density

* Temperature Thermocline
* Salinity Halocline

Geography of the Sea Floor（今晚出）

* 1. **Dynamic analysis of submersibles**

Weight

Floatage

FrictionC=0.03 类比鱼

F=1/2rou\*s\*c\*v^2

* 1. Model Evaluation of Uncertainty