

**【Grant-in-Aid for Scientific Research(S)】
Science and Engineering (Engineering II)**



Title of Project : A New Spilled Oil and Gas Tracking Autonomous Buoy System and Application to Marine Disaster Prevention System

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Research Area : Integrated Engineering (Naval and Maritime Engineering)

Keyword : Undersea and subsea engineering, Environmental model, Reduction technology of environmental impact, Environmental safety and security

【Purpose and Background of the Research】

There have been many major sea oil spills in recent years. These spills damage not only the ocean environment but also regional economies. Once spilled oil washes ashore, it is difficult to effectively recover it. This results in a high residual amount of spilled oil and long-term damage to the environment as well as to marine and human life.

The objectives of this study are as follows:

- (1)Autonomous tracking and monitoring of spilled plumes of oil and gas from subsea production facilities by an underwater buoy robot,
- (2)Autonomous tracking of spilled oil on the sea surface and transmission of useful data to a land station through satellites in real time by multiple floating buoy robots,
- (3)Improvement of the accuracy of simulations for predicting diffusion and drifting of spilled oil and gas by incorporating the real-time data from these robots.

【Research Methods】

This research project adopts the following methods to realize these objectives:

- (1)An underwater buoy robot equipped with a buoyancy control device and two pairs of rotational fins for guidance and control, and sensors to detect dissolved gas and oil will be developed. It will be tested in areas in the Gulf of Mexico and off Niigata where methane gas is released.
- (2)Multiple floating buoy robots equipped with sails—the orientation and size of which are adjustable—and sensors to detect oil slicks on the sea surface will be developed. They will be tested in Japan using artificial targets on the sea surface, and in Norway using real oil on the sea surface.
- (3)A data fusion method incorporating real-time measured data from buoy robots in simulation models for not only gas and oil blowouts, but also spilled oil drifting on the sea surface will be developed.

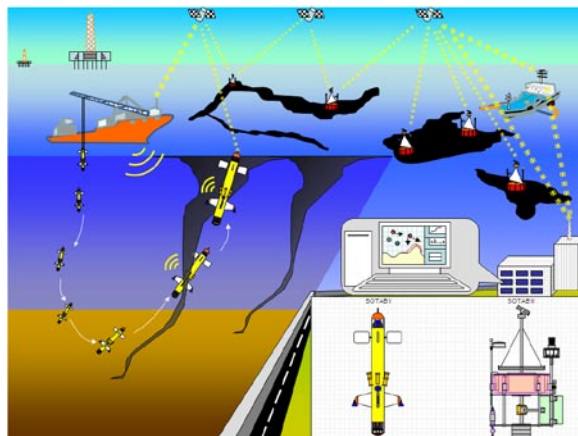


Fig.1 Concept of spilled oil and gas tracking autonomous buoy system

【Expected Research Achievements and Scientific Significance】

The system described above can be applied to regular environmental monitoring around subsea production facilities, the collection of spilled oil drifting on the sea surface, and the deployment of oil-recovery devices.

【Publications Relevant to the Project】

- H. Senga, N. Kato, M. Yoshie et al., Spilled Oil Tracking Autonomous Buoy System, J. of Advanced Robotics , Vol. 23 , pp.1103 - 1129 ,2009
- H. Senga, N. Kato, H. Suzuki, M. Yoshie, T. Tanaka et al., Development of a New Spilled Oil Tracking Autonomous Buoy, Marine Technology Society Journal, Vol.45, No. 2, pp.43-51, 2011

【Term of Project】 FY2011-2015

【Budget Allocation】 156,200 Thousand Yen

【Homepage Address and Other Contact Information】

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