Disk Type Underwater Glider for Ocean Observations

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As one method of acquiring data, we propose a virtual mooring system using an underwater vehicle, and have developed a full-scale test-bed vehicle called “BOOMERANG” which can glide back and forth between the sea surface and the seabed collecting ocean data. This report presents results of the field experiment and details of the construction of the prototype vehicle for practical use.

1. Introduction

In recent years predictions of changes in the environment on earth and studies on ecodevelopment have become increasingly important. Such predictions necessitate ongoing ocean data in time and space. However, construction of a conventional mooring system requires manpower and great expense. To solve this problem, a test-bed underwater glider for virtual mooring was constructed at the Research Institute for Applied Mechanics, Kyushu University 1, 2). The concept of virtual mooring using an underwater glider is shown in Fig.1. The vehicle that houses various pieces of observation equipment glides back and forth between the sea surface and the seabed collecting ocean data. When the vehicle returns to the sea surface, the measured data is transmitted to a research base by a mobile phone. The vehicle then automatically checks its current position by GPS. If the position is outside the sea area of virtual mooring because of currents etc., the vehicle is controlled so that it returns to the previous area during its next dive. Diving and surfacing are repeated periodically.

Since the results of the field experiment in March, 2010 were satisfactory, a prototype for practical use was constructed beginning in April, 2010. In order to improve reliability and to enable prolonged use, the performance of various pieces of loading equipment of the vehicle was improved.

2. Field experiment results of test-bed vehicle

The principal dimensions of the test-bed vehicle are shown in Table 1, and a photograph in Fig.2. The maximum diving depth of the vehicle is 100 m, and the body diameter 1900 mm. The hull is made of FRP and the sensors for motion control, buoyancy adjustment equipment, weight shifter, electrical devices, battery, CTD sensor and the mobile phone for transmission and reception of observed data and commands are carried within it.