

## **Strain Measurement on Riser Pipe of “TAKUMI”**

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### **ABSTRACT**

The Ocean Nutrient Enhancer “TAKUMI” was installed in Sagami-Bay in May 2003. It is a SPAR type floating structure with a riser pipe for pumping up the Deep Ocean Water. The inner diameter and length of the riser pipe are 1m, and 175m. This riser pipe has strain gages, which were installed to a riser pipe at 85m below the top end of the riser. These strain gages faced to 8 directions.

The authors had measured from 2003 to 2005 not only strains but also motions of the floating structure, wind and wave conditions.

This paper presents the measured and statistical results, and relationship between strains and motions of the floating structure or wave or current. The maximum value and cyclic period of strain were approximately obtained as 0.14% and 9 second, respectively. These values are almost the same as the design values. The strains have some relation to roll and pitch motions of the floating structure. However, the relationship between wave or current and strain is not articulated. From these results, the main factor of the riser pipe behavior is concluded to be the motions of the floating structure, not wave and current.

**KEY WORDS:** Riser pipe, Deep ocean water, Floating structure, Strain, Full scale measurement

### **INTRODUCTION**

The ocean Nutrient Enhancer “TAKUMI” is a SPAR type floating structure with a riser pipe. By pumping up the Deep Ocean Water containing rich nutrient, and sprinkling it near the sea surface, plankton is made to increase and it aims to form a good fishing ground. “TAKUMI” was installed in Sagami Bay in May 2003. It has some measurement equipments for oceanographic observation, the motion of floating structure and the strain gages.

The point of view of this paper is the results of strain measurement. The strain gages were installed at the middle height of the riser pipe. Data were accumulated from 2003 to 2005. Measured items were not only

stress of the riser pipe but also the wave height, the current speed and the motions of the floating structure. Through these measured data, we show the results of the statistical analysis, of which the appearance ratio and the correlation between the stress and the sea condition or the motion of the floating structure. Furthermore, the correlation between the stress and the pitch or roll motion in storm condition is discussed.

### **RISER PIPE AND STRAIN GAGE**



Fig.1 Photographs of the riser pipe  
(Upper : the top end, Lower: the whole)