EXPERIMENTAL INVESTIGATION OF RIVER BED METERIALS BY USING THE CHARACTERISTICS OF ULTRASONIC SENSOR

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According to increasing of traffic volume in every year, the road net has been extending and many bridges were constructed. Hence, interesting of bridge scour was increasing but the research about bridge scour is not accomplished actively.

Bridge scour is difficult to approach theoretically because of numerous factors and difficulty about similarity ratio, so the estimation of scour depth have been used the bridge scour equations developed in other countries in Korea. But the most of the equations have many restrictions because it does not be considered various river bed conditions. Among these conditions, the river bed materials have a big effect to bridge scour.

Recently, the ultrasonic scour sensor was developed in Korea and used to monitor in bridge scour field. The developed sensor is possible to measure scour depth in flood using real-time monitoring which had been difficult. The aim of this study is to provide basis to estimate river bed materials at area where have possibility of scour, by using the ultrasonic wave of developed sensor.

Because reflection peculiarity of ultrasonic waves is different according to reflection surface, if we did analysis on the reflection of the waves then could judge the river bed materials. So, we made a water tank and conducted experiments to obtain each reflection forms about various river bed materials.

In this study, It was used that intensity and average intensity of the reflection wave in the reflection peculiarities. The variance of each reflection graph and summation of the variances were obtained with differences which compared it with the average graph. The average graph was about 200 data of each material.

Therefore, it was confirmed that the more small particles, the reflection intensity was stronger within the range of a limited variance value, and the larger particles, the variance is increased within the range of limited reflection intensity.

Each material was distributed on different area in the result graph. As the result of this experiment, it was provided with a quantitive standard which is able to classify the river bed materials using ultrasonic scour sensor. Moreover, in the field test of these results at

Mapo bridge of Han River, it was possible of a fair judgment of river bed materials or the change of it when the river flow is normal and floods.

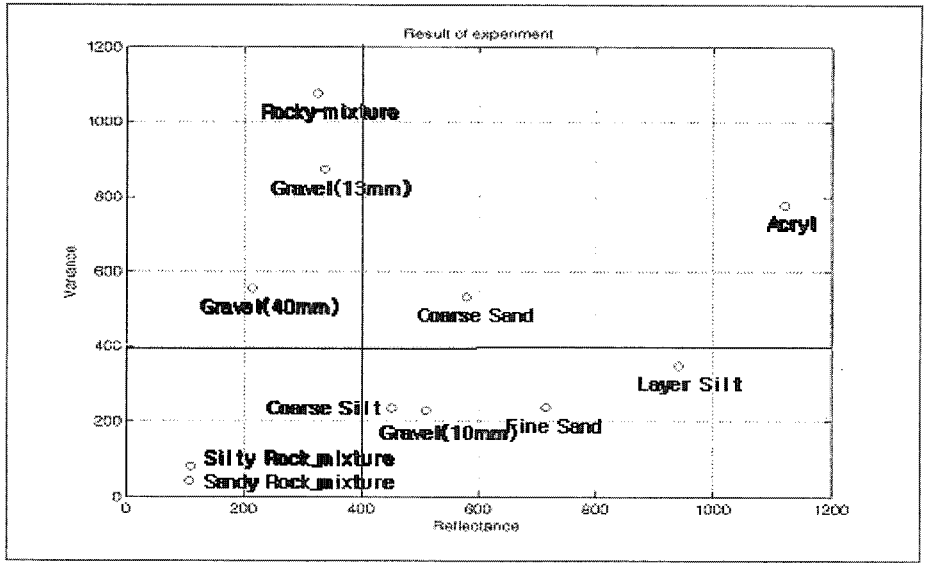

Fig 1. The result of the experiment about each material.
(X-axis : reflectance, Y-axis : variance)