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Fundamental Studies of Utilization of Pozzolanic Materials in Kyushu

Kinji SHINOHARA

The object of this research is to clarify engineering properties of pozzolanic materials found in northern Kyushu in making use as pozzolan mortars or cement admixtures. In this report the author describes, first, some properties of pozzolans, and then points out practically suitable conditions for using pozzolans as mixtures of slaked lime or as cement admixtures from various experimental results.

The natural pozzolans used in this experiment are mainly Karatsu, Iki, Chikushi and Amakawa earth. These are generally considered to be derived from basalt and andesite by weathering action. Their specific gravity is $2.3 \sim 2.7$ and these values are somewhat smaller than ordinary earth. The unit weight is sufficient to be assumed as about 0.9 t/m^3 in practical works.

Most suitable conditions in using pozzolans as mixtures of slaked lime are as follows.

The water used is the best at somewhat smaller amount than that gives the maximum density of mixtures in the case of the dry mortar and amply compacted state as in making mortar bricks and blocks, but in the field work it is the best at $30 \sim 40$ % of weight of pozzolan cement.

The fineness of pozzolans used in practice is adequate to the size which passes through 0.6 mm shieve. The proportion of mix of pozzolan and lime is the best between 6 : 4 and 7 : 3, and the amount of lime must be increased in proportion to the amount of the sand if the sand is added to pozzolan mortar. It differs with the varieties of pozzolans whether the addition of sand to pozzolan mortar is effective or not. Pozzolan mortar must be cured in the wet state lest its strength after long time should be decreased, though it may be cured in the dry state within one month after its making.

The properties of the mixtures of pozzolan and cement are as follows; To mix pozzolan with cement is not greatly affected on the setting time in the case of usual amount of pozzolan. Permissible amount of pozzolan to be mixed with the cement is practically 25 % of the weight of cement from the view point of the strength. When the small amount of cement is mixed with pozzolan, it is greatly advantageous to make first pozzolan cement which is the pozzolan mixed with suitable amount of lime, and then to mix cement with it.

It is effective to a certain extent to use pozzolan cement as a soil stabiliser. As an example of artificial pozzolan, boilor ashes are studied. The relation between their chemical ingredients and strength or the relation between the amount of lime and water, and strength is found to be almost same as that in natural pozzolans.

On a Cause of the Error Accompanying the Velocity Measurements with a Cylindrical Pitot Tube

Yasutoshi SENOO

It is sometimes required to measure the velocity and the statical pressure at a point in a flow of two dimensions. For this purpose a cylindrical pitot-tube is very convenient and is often used in practice, because an ordinary pitot-tube cannot be employed for the flow which is not one dimensional. In all cases a cylindrical pitot-tube is calibrated from a test in a uniform flow of one dimension and the coefficient obtained by calibration is applied to all kinds of two dimensional flows. However, in order to know the correct velocity of any two dimensional flow, it is necessary to verify whether this coefficient may be applied without any sensible error.

In this report the pressure around a cylinder placed in several types of two dimensional flows is calculated assuming that the flow has a velocity potential, and is compared with that of a uniform stream of one dimension. The important results obtained are as follows:

(1) In general, the pressure distributions on both sides of a cylinder are not equal to each other when the cylinder is placed in a two dimensional flow. But at the two points on the cylinder which are distant 43° in the central angle from the forward stagnation point, the pressures are practically equal for any type of two dimensional flows. Conversely, if the pressures at two points distant 86° from each other are equal, the direction of the flow coincides with the bisector of the angle between these two points. The pressure difference between the forward stagnation point and side hole is determined chiefly by the magnitude of the velocity but is slightly influenced by the character of the flow, therefore the correct magnitude of the velocity cannot be accurately estimated by the pressure difference alone.

(2) According to some experimental data, we can conclude, if a large measuring hole is drilled on the cylinder, the pressure measured by the hole does not show the value prevailing at the center of the hole but shows the value of the point displaced about 0.37 time the diameter of the hole up-stream from the center. Namely the central angle between two adjacent measuring holes should be larger than 43° in proportion to the ratio of the diameters of the hole and the cylinder.

(3) The velocity measurement is sometimes influenced by the sources and sinks, but not sensibly by the vortices.

(4) Even if the pressure on the cylinder is periodically disturbed by the moving vortex streets, the velocity estimated from the mean pressure is very little different from the mean velocity of the flow.

A Note on the Measurement of the Velocity of Water by a Hot Wire Anemometer.

Masato HARADA
and
Michinori KURIHARA

Some preliminary experiments were conducted to measure the velocity distributions (ranging from a few cm/sec to about 1 meter/sec) in a water channel by a hot wire anemometer.

NOTE

On the Spring Coefficient of an India-Rubber Ball

Jun-ichi OKABE and Michio OHJI

No. 2, December, 1952

Basin-Area Maps of Main Rivers of Kyushu

Haruo MATUO

The length and basin areas as well as the longitudinal profile of main rivers in Kyūshū was investigated from the map of 1/50000 scale, published from Japan Geographical Investigation Institute. The results are shown in the following figures. From them we can see the features of each rivers, and we hope they are of use for river engineers.

On the Compreg as an Orthotropic Material and Some of its Inelastic Properties

Masakazu HIGUCHI

The fisrt chapter of the paper is a brief historical introduction to the theory of anisotropic elasticity.

The method to determine the coefficients of elasticity is explained and the values of nine elasticity coefficients of Compreg are given in Chapter 2. Moreover, the two indices k_r and k_s which are determined with the elasticity constants of the material and used in the mathematical treatment of the boundary value problems of the theory of anisotropic elasticity, are computed and compared graphically with those of some species of wood.

Investigating the mechanical behavior of Compreg, the author recognizes the inelastic character of the material. What are the elasticity constants of the material which is not perfectly elastic? The problem is discussed in Chapter 3, and the inelastic behaviors of the material, especially those of primary creep and relaxation are explained phenomenologically with some characteristic constants which are determined with the author's experiments.