STUDY ON ESTIMATING COMPRESSIVE STRENGTH AND PHYSICAL CHARCCTERISTIC OF STRUCTURAL LIGHTWEIGHT CONCRETE WITH FOAM AGENT

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Introduction

The structural light-weight air void concrete has advantage of having a low density with respect to same compressive strength in comparison with ordinary and heavy-weight concrete.
In this study, we evaluated physical properties of mortar added air voids by manufacturing specimens for developing light-weight concrete for structural purpose. Physical properties were evaluated by manufacturing specimens with structural light weight forming concrete using ordinary aggregate for application of light weight concrete based on this results. Also, correlated equation about compressive strength of lightweight concrete was derived by a porosity as a variable according to the mixture of forming agent, and prediction equation about compressive strength was finally derived.

Experimental

This experiments were carried out to get density and compressive strength for using structure if compressive strength decline. Compressive strength of concrete which does not adding a forming agent and porosity ratio establish High strength. W/B sets 17%, 24% and Comparison subject
of W/B 60% is made for comparative assessment of characteristic.

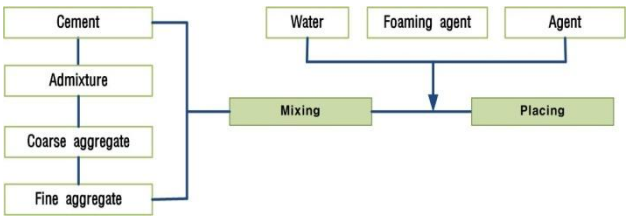

Fig 1. In this study, method of manufacture of lightweight foam concrete

In this experiments, Manufacturing methods of light-weight concrete are shown in Figure 1. Cure conduct standard curing.

Results and Discussion

Figure 2 expresses density of fresh light-weight concrete which is divided into addition amount of W/B and foaming agent. If amount of forming agent are increased, Apparent density is declined. In the w/b 17% and foaming agent reasonable 0.6%
more foaming agents in the contents by increasing the density (density) was the reduction. It is judged that the maximum addition amount of forming agent was considered as 0.6% to make closed-cell

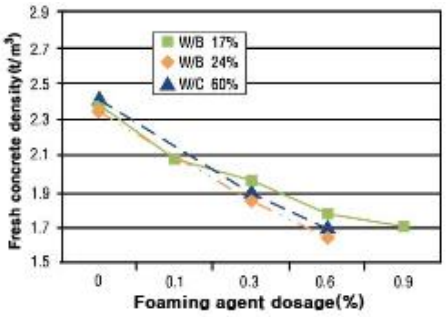

Fig 2. Fresh concrete density, foaming agents according to the dosage

Figure 3 indicates the relationship between the amount of foaming agent addition and porosity rate.
As the amount of foaming agent increases, the porosity rate tends to be increased until 0.9%. The porosity rate is also higher as water to cement ratio is increased in the same amount of foaming agent addition. That's the result of friction between sand and water in my judgement. W/B 60% the result of comparing the first bubble, depending on the dosage of W/B 17%, W/B 24% and showed a similar decrease in density

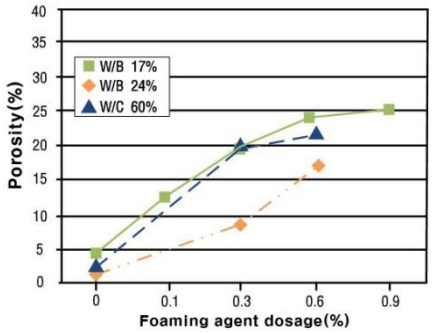

Fig 3. Compressive strength to density

Figure 4 show the relationship between porosity rate and compressive strength of concrete. Regardless of water to cement ratio, compressive strength is decreased as porosity rate is increased in concrete. Thus concrete compressive strength can be can controlled by changing porosity rate. Following equation depicts the relationship between compressive strength and porosity.

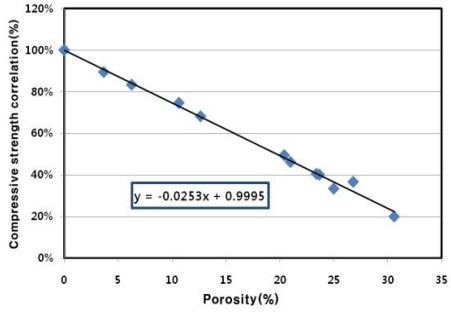

Fig 4. Porosity and compressive strength correlation

$$Fp = (1-\beta Ap)F28 \qquad \text{(Expression1)}$$

Fp= Estimate the strength (MPa),

F28= 28 days compressive strength (MPa)

Ap= Porosity (%),

β = Experimental constant (β = 0.0253)

As one can see Figure 5 estimated compressive strength development and the result of measurement are well matched.
We conclude that compressive strength of light weight concrete can be predicted using the relationship that we have found based on porosity rate above

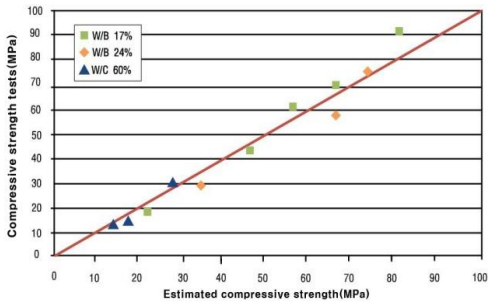

Fig 5. Compressive strength to density

Conclusion

The conclusion was followed by analyzing results by this prediction equation.

1. Density of concrete becomes low by forming porosity with an increase of adding a forming agent. However, it appears that density become low by disappearance and overlap of forming, and it was verified with the SEM analysis.

2. Forming a porosity by mineral forming agent applied in this study gave good performance when w/B were high. It was because forming was made by the friction of sand and water.

3. The elastic modulus and compressive strength can be predicted based on variables both the compressive strength of concrete which did not adding a forming agent and porosity ratio. It is also judged that predicting the elastic modulus which has different porosity ratio and compressive strength of light weight forming concrete can be possible.

Acknowledgement

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