

The Prediction Model of the Correction Coefficient of Concrete Strength is Tested based on the Method of SPSS Regression Analysis

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Abstract

With the regression analysis of SPSS software, the diameter and the ratio of height to diameter were included into the control variables, and the prediction model of the correction coefficient between the non-standard specimen and the standard specimen was established when the C25 pumping concrete was used to test the strength of concrete by drilling core method.

Keywords

SPSS; Core Method; Correction Coefficient.

1. Introduction

When testing the compressive strength of concrete with the drill core method, it is increasingly difficult to drill the concrete core sample with the standard diameter of 100mm. The small core sample can effectively reduce the damage to the effective area of the member and the stressed steel bar. To avoid confusion, it is necessary to explore the relationship between the compressive strength of non-standard and standard cores. [1]

2. Core sample preparation

Local representative raw materials were selected for the test. Cement: "Jidong brand" 32.5R ordinary Portland cement and 42.5R ordinary Portland cement; Water reducing agent: polycarboxylic acid water reducing agent, water reduction rate of 30%; Sand: natural river sand in Qian an County, fineness modulus is 2.6; Gravel: Natural gravel produced in Qian an, particle size 5-20mm. [2]

C25 pumping concrete was used to pour samples with the size of 2 500 mm×1 650 mm×200 mm, and vibrating rods were used to vibrate. Nature conservation; The slump is greater than 220 mm.

Core sample drilling position: 18 250 mm×250 mm test areas were evenly arranged in the specimen, and 2 cores with a diameter of 100 mm, 1 core with a diameter of 70 mm and 1 core with a diameter of 50 mm were drilled in each test area. All drilled cores were numbered in a unified manner.

Pay attention to control the saw cutting speed, in the grinding machine grinding face, can use polymer cement mortar, epoxy mastic, cement paste or cement mortar to fill the end face, can also use sulfur mastic to fill the level. The size of the core sample in the final compression test shall comply with the following provisions: a. The difference between any diameter along the height of the core sample and the average diameter shall not be more than 2mm; b. The roughness of the end face of the compression core sample shall not be greater than 0.1mm in 100mm length; c. The non-perpendicularity between the end face of the core sample and the axis shall not be greater than 1; d. The core sample shall not have cracks or other large holes [3].

3. SPSS regression analysis results:

Table 1. Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.939 ^a	.881	.880	.07489

a. Predictors: (constant), height-diameter ratio, diameter

b. Dependent variable: correction factor

In this study, the Adjusted R Square was 88%, indicating that 88% of the change in the correction factor could be explained by the independent variables participating in the study.

Table 2. ANOVA^a

Model	Sum of squares	df	Mean Square	F	Sig.
1 Regression	6.624	2	3.312	590.497	.000 ^b
Residual	.892	159	.006		
Total	7.515	161			

a. Dependent variable: correction factor

b. Predictors : (constant), height-diameter ratio, diameter

It can be clearly seen from the above Anova table that $P=0.000 < 0.05$ indicates that at least one of the independent variables in this study can significantly affect the correction coefficient of the dependent variable. In order to further determine which independent variables can significantly affect the dependent variable, the following coefficient table should be further analyzed:

Table 3. Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(constant)	-.320	.030		-10.565	.000		
	diameter	.360	.029	.343	12.568	.000	1.000	1.000
	height-diameter ratio	.916	.029	.874	31.985	.000	1.000	1.000

a. Dependent variable: correction factor

All control variables can significantly affect the dependent variables, which further demonstrates the necessity of including control variables in this model. $P=0.000 < 0.05$ for diameter, indicating that diameter can significantly affect the correction coefficient. Furthermore, the influence of diameter on the correction coefficient is $0.36 > 0$, indicating that the influence of diameter on the correction coefficient is significantly positive, meaning that the larger the diameter is, the larger the correction coefficient will be. Similarly, it can be concluded that the ratio of height to diameter can significantly positively affect the correction coefficient. From this, the final return equation can be obtained: $y = \frac{D}{100} \times 0.360 + \frac{l}{D} \times 0.916 - 0.320$.

4. Conclusion

Using SPSS software to analyze the data regression of core samples, the diameter and high diameter ratio were found to have a significant effect, the regression equation of the correction

coefficient between the non-standard specimen and the standard specimen: $y = \frac{D}{100} \times 0.360 + \frac{l}{D} \times 0.916 - 0.320$.

References

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