An Experimental Study on Strain Distribution of Concrete adjacent to Precast-Prestressed Joint.

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1. INTRODUCTION

When precast members are united by using pre-stressed joint with rubber, there is a possibility of strain distribution not being uniform. In this study, we investigated the relation between PC tension and strain of surface concrete adjacent to pre-stressed joint, and showed that the strain distribution varies in accordance with the rubber thickness.

2. OUTLINE OF TESTS

Fig.1 shows the measure of the concrete specimen. Each specimen was a 300mm length cylinder, which has a hole with a diameter of ϕ＝18mm. The schematic figure of the test is shown in Fig.2, also. The mix proportion of concrete and its properties can be found in Table 1 and Table 2. The tension was gradually introduced by a hand-operated hydraulic pump up to 90kN. We performed 7 series of tests, the cases of the sandwiched rubber thickness being 0,1,3,5,10.15 and 20mm.

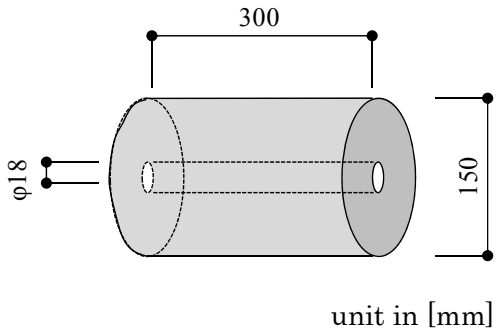
Using this procedure, we obtained the relation between PC tension (P) and strains(ε) for each test.

3. EXPERIMENTAL RESULTS

The P-ε relations of the tests are shown in Fig.3 (t=10mm) and Fig.4 (t=0mm). Fig.3 indicates that the more the PC tension was introduced, the more the strain increased in all the measurement points. Meanwhile, the test result of t=0mm (Fig.4) shows the tendency that the strain at each point kept constant or increased slightly.

In addition, there are some measurement points, in which even tensile strains generate. Fig.5 shows the relation between P and the mean of the measurements of 16 strains on concrete surface, ε_m. The black line in the figure is the P-ε relation with the stress, on the concrete-rubber interface, assumed to be distributed uniformly.

In the case that the rubber thickness is 20mm, the ε_m increases along the calculated value (black line) up to P=90kN. Accordingly, the stress generated by the PC can be supposed to distribute uniformly. On the other hand, the P-ε_m relations of t=0, 1 and 3mm show the small strains throughout all the loading steps. These results indicate that the



unit in [mm]

Fig.1 Measure of concrete specimen

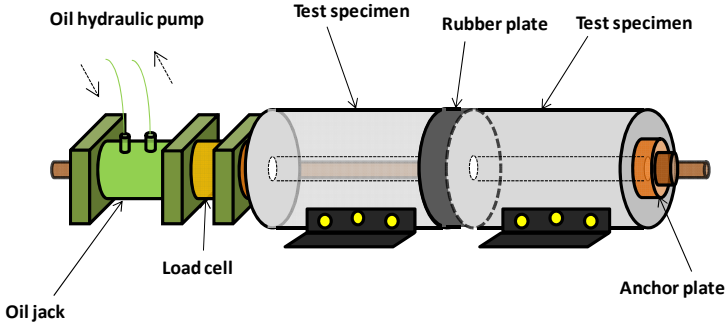


Fig.2 Schematic Figure of the test

Keywords : Prestressed joint , PC tension, Strain distribution

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Table 1 Mix proportion of concrete

Gmax (mm)	Unit weght(kg/m^3)						
	W	C	BFS	Ex	S	G	Ad
20	168	261	261	50	736	890	6.41

Table 2 Material properties of concrete

Compressive Strength	82.5MPa
Elastic Modulus	35.5GPa

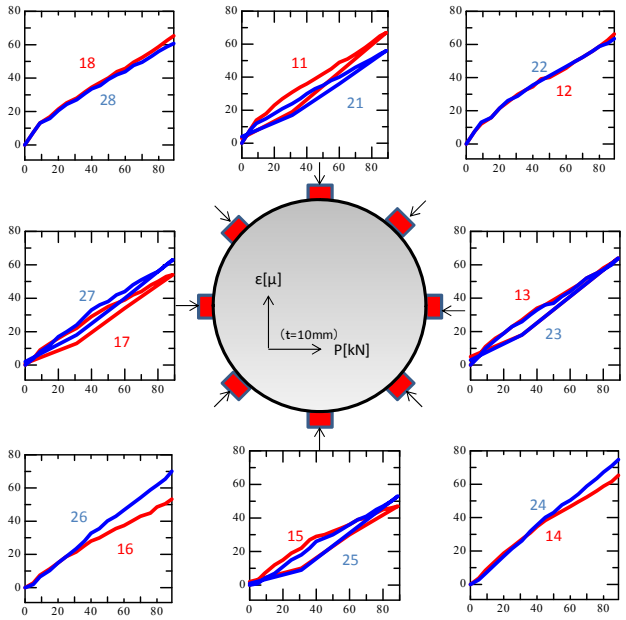

Fig.3 Relation between PC tension and surface concrete strains (t=10)

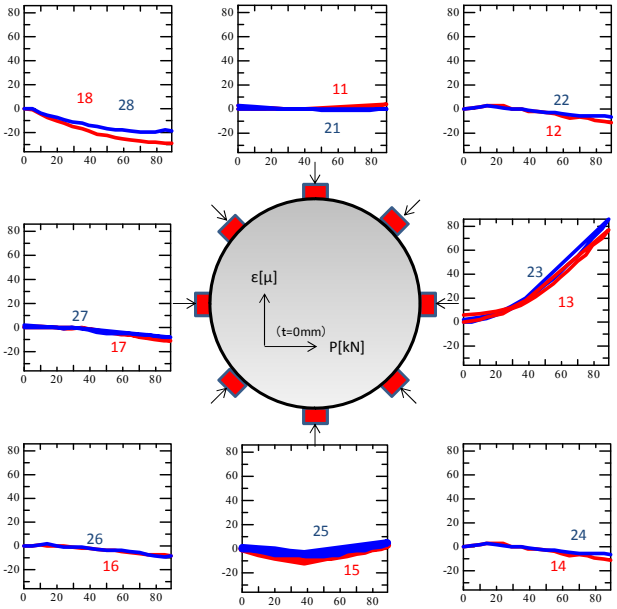

Fig.4 Relation between PC tension and surface concrete strains (t=0)

contact between the concrete and rubber (for t=1,3mm) or between two pieces of concrete specimen (for t=0) should be lost by the local PC tension, and therefore, the strain on the concrete surface couldn't transfer from one side to another.

4. CONCLUSIONS

To observe the strain behavior of concrete by the pre-stressed joint, we performed several tests. The results showed that the pre-stress, which was introduced by PC, can affect the strain distribution of concrete at the joint. However, the extent of ununiformity varies in accordance with the thickness of the sandwiched rubber.

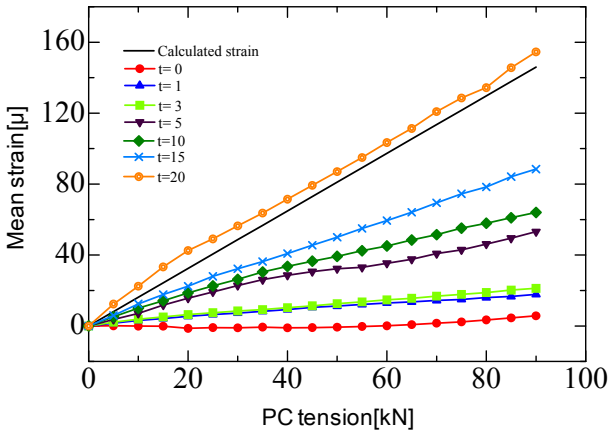

Fig.5 Relation between PC tension and mean surface concrete strains

ACKNOWLEDGEMENT

We are grateful to Dr. Hiromasa KIMATA in Daido University for his important contributions to the experiments.

REFERENCES

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