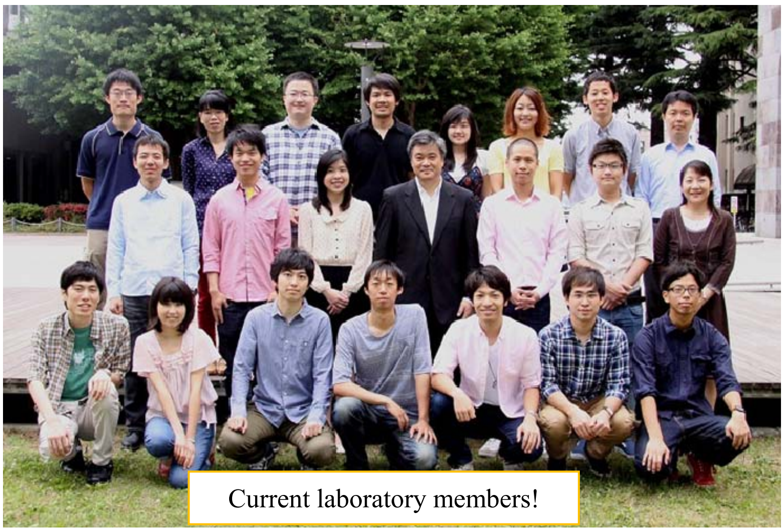
A new life in Japan

My name is Hou Chenwei, and I'm a master's student at Tokyo Institute of Technology's Department of Civil Engineering. The editor of the JSCE Concrete Committee newsletter has kindly given me this opportunity to express my feeling and thoughts about being in Japan. It is my pleasure to respond here.

Being attracted by Japanese culture and the beautiful scenery of the country, I first came here as an exchange student. During the first several months of my exchange, I experienced a lot of things, in particular the 2011 Great East Japan Earthquake. I fell in love with this beautiful country. By applying for the international graduate program at Tokyo Institute of Technology, I was able to come to Japan again as a master's student and begin a new life here. At this moment, I am really enjoying my master's studies as well as being in Tokyo. It's such a convenient city; I can easily visit many places with my friends on weekends. The people here are friendly, and that helps relax me, although study and research are intense. Unlike my lifestyle back in my home country, I live alone here in Japan and have become more independent now. Apart from Japanese culture, the great atmosphere at my laboratory is also an important reason for wanting to study in Japan.

There are many international students at the laboratory, making conversations about daily life more interesting and global. Normally, each student has his or her own research topic, and mine relates to RC haunched beams. We have a weekly seminar on Mondays where we introduce and discuss our new research topics. We also do presentations at monthly seminars with another two cooperating laboratories. The comments and questions raised during these seminars help us improve our future work. Besides the research work, we have many parties, canoe competitions and volleyball games as well as a seminar trip once per year. I was especially moved by a surprising birthday party organized for me a first in my life. Alternating research work with relaxing parties, we work hard and play hard like a big family. We always welcome newcomers and there are farewells for student's graduate. We all pitch in to help with concrete casting when necessary. We all celebrate a fellow student's successful job hunt. And we go traveling together during vacations. I love this kind of life and it encourages me to do better in my future studies. To finish, I would like to introduce a part of my research work with the following extended abstract.


Current laboratory members!


Doing loading test!


Birthday Present!


Mini Canoe Competition!


Trip with lab members!

Shear Resistance Mechanism of Reinforced Concrete Haunched Beams without Shear Reinforcement

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Abstract: Reinforced concrete haunched beams (RCHBs) are widely used in bridges and framed buildings, however, there have been limited studies on the shear capacities of RCHBs. The aim of this study is to clarify the shear resistance mechanism of RCHBs without shear reinforcement. A four-point bending test is conducted on three RCHBs with different haunch positions. Crack patterns, load-displacement curves and failure modes are investigated to determine the shear capacity of RCHBs. It is found that the position of the bends in the tensile reinforcement at the haunches highly influences crack propagation, failure mode and shear capacitiy.

1. Introduction

Reinforced concrete haunched beams (RCHBs) are often used in simply supported and continuous bridges, framed buildings for economic and aesthetic reasons. However, there is little experimental data available for predicting the shear behavior of RCHBs. Moreover, no rational and economical design method has yet been established in JSCE design specifications [1]. In this study, the effect of haunch position (with respect to the loading point) on the shear resistance mechanism of RCHBs without shear reinforcement was investigated.

2. Specimen details and experimental setup

Figure 1 and **Table 1** give details of the three tested beams. The inclination of tensile bars and the bottom surface, α was fixed at 11.3 degrees. The experimental parameters of these beams were the distance of the haunch from the loading point, which is also used to name the specimens. The non-test portion of the beam span was provided with stirrups so as to ensure that failure occurred in the test portion. During the four-point bending tests, the mid-span deflection and the strain in the tensile bars at various locations were measured using displacement transducers and strain gages. Also crack propagation on the surface of the test-span was captured during loading by taking pictures.

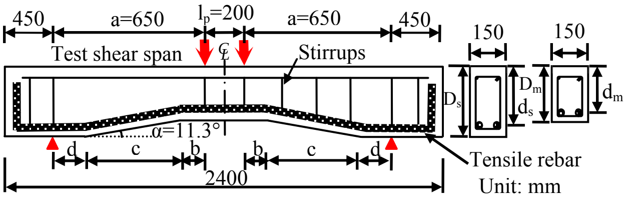

Figure 1: Typical specimen detail

Table 1: Specimens details and material properties

No.	f_c' (N/mm^2)	b (mm)	c (mm)	d (mm)	d_s (mm)	d_m (mm)
H-100	33.56	100		300		
H-200	29.62	200	250	200	250	200
H-300	36.68	300		100		

b: distance between loading point and beginning of haunch; d_s: effective depth at support; d_m: effective depth at mid span.

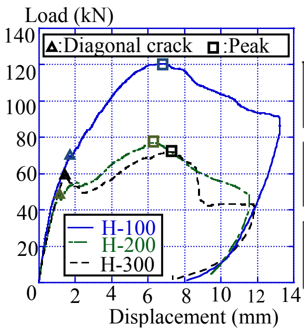

Fig. 2: Load-displacement curves

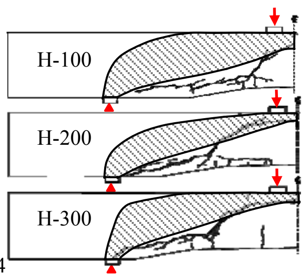

Fig. 3: Cracks at peak load

3. Experimental results

Figure 2 shows the resulting load-displacement curves. The shear capacity of beam H-100 was the largest (60.3 kN), with the values for H-200 and H-300 smaller by 36% and 40%. **Figure 3** shows the crack patterns of the specimens at the peak load. In all beams, cracking initiated where the tensile reinforcing bars were bent at haunch and proceeded along the inclined reinforcing bars towards the loading point.

Due to the presence of debonding cracks, arch action developed in the test shear span. The amount of concrete above the diagonal cracks varied according to the individual crack pattern and that resulted in the arch action having a varying contribution to resisting shear force. A larger amount of concrete above the diagonal cracks resulted in higher shear capacity.

4. Conclusions

The distance of beam haunches from the loading point has a significant effect on the shear capacity of the beam. The haunched shape of RCHBs results in arch action even in slender beams, but contributions of the arch action varied in accordance to variations in the crack pattern.

References

[1] Japan Society of Civil Engineers (JSCE), "Standard Specifications for Concrete Structures [Structural Performance Verification]," 2002.