Committee Report: JCI-TC203A Technical Committee on the Flexural Behavior of Unbonded Prestressed Concrete Members

委員会報告：JCI-TC203A アンボンドプレストレストコンクリート構造部材の曲げ挙動に関する研究委員会

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Abstract
We gathered information about unbonded prestressed concrete (UBPC) structures from civil and building engineering in Japan and overseas. We explained the effect of the bond of prestressing tendons on the resisting mechanism and structural performance of the UBPC members and described the methods to simulate the backbone curve. We introduced some applications such as external cable systems for bridge girders and cable-stay brides in civil engineering; and slabs, walls, and self-centering systems in building engineering.

1. Introduction
In this technical committee, we focused on the flexural behavior of unbonded prestressed concrete (henceforth, UBPC) members. The external cables have been used since the 1990s for corrosion prevention and efficient maintenance of PT tendons in civil engineering. UBPC members had not been allowed to use in buildings except for secondary members such as slabs in building engineering until the revision of the notification was made in 2007. The PRESSS project in the 1990s clarified the UBPC system not only simplifies construction but also produces interesting structural performances. We summarized information on the UBPC structural system: resisting mechanisms for flexure and shear, their usage in structures, the accuracy of existing equations for backbone curves, and new methods and equations for backbone curves. All the committee members contributed to the original report and the chair and secretary made a summary in this article.

The technical committee started in April 2020. The chair and three secretaries had the first meeting to discuss a two-year activity policy at the JCI headquarters in June 2020. Face-to-face committee meetings were not held for the next two years due to the COVID-19 pandemic. However, the four WGs held regular online meetings and completed the report. We thank each member for their enormous contributions by listing all 16 members in Table 1.

2. What is an unbonded PC structure?
The reinforced concrete (RC) structure is used as the representative concrete structure. In the RC structure, the concrete bears the compressive stress and the reinforcing bar.....

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