Code PLATFORM ver.1 ～Principles, guidelines and terminologies for structural design code drafting founded on the performance based design concept～

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1. Introduction

As a recent years' discussion and improvement on design code, the concept of performance based design has been widely accepted, and a base code such as ISO2394, ISO13822 or Eurocode0 has been drafted, and has increased their importance in drafting of design code. In contrast to a specific design code, a base code, which is often called "comprehensive design code" in Japan ("comprehensive design code" is used thereafter), has a role to specify design concept and a framework of designing, but detailed specifications. The comprehensive design code, being placed at the highest hierarchy of design code system, allows a particular specification defined in a specific design code, which comes from unique characteristics of corresponding structures.

When we look into the design code system in Japan, it is clearly noticed that the major structural design codes have been developed independently without effort of harmonizing with other codes. Consequently, it is understood from overseas that Japan has a unique and complicated design code system, which might lead to a foreign trade barrier.

Based on the above background, the code PLATFORM ver.1 (Principles, guidelines and terminologies for structural design code drafting founded on the performance based design concept) was drafted after two years' intensive discussion in a committee at JSCE among code writers. PLATFORM, as a comprehensives design code, defines terminologies and other formats including procedures for performance criteria as well as allowable verification procedures. Founded on the performance based design, PLATFORM, contributes to harmonize design codes in Japan by standing at a highest hierarchy of the structural design code system.

2. Discussion and drafting of PLATFORM

In order to discuss and draft PLATFORM, a special committee was formed in JSCE and worked for two years in 2001 and 2002 (chair: O. KUSAKABE in Tokyo Institute of Technology, secretary-general: Y. HONJO in Gifu University, secretary: Y. SASAKI from Kajima Corp.). The committee is mainly consisting of code writers from various fields including earthquake, wind, and wave resistant design, concrete and steel design, and even architectural design. In the committee, working groups with three different tasks were set up for code-drafting. S. SAWADA (Kyoto University), K. TANI (Yokohama National University) and Y. TANIMURA (Railway Technical Research Institute) were committed to draft on framework of design and performance requirements. S. KATSUKI (National Defense Academy in Japan) and T. SUGIYAMA (Yamanashi University) drafted determination of terminologies. E. YAMAGUCHI (Kyushu Institute of Technology) and Y. KAMIHIGASHI (Japan Highway Public Corporation) were dedicated to draft on allowable verification procedures. Y. HONJO, as a secretary-general, coordinated all three working groups.

3. Feature of PLATFORM

The table of contents of PLATFORM is shown in Fig.1. After defining terminologies related to structural design in Chapter.1, PLATFORM specifies its applicability and the format of design code in Chapter.2. PLATFORM also encompasses its description to the procedure of determining performance criteria, which is design target specified in a quantitative manner in Chapter.3, and specifies allowable verification procedures in Chapter.4.

Keyword: comprehensive design code, performance based design, performance requirement/criteria, code harmonization

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Fig.1 Table of contents of PLATFORM

The main characteristics or features of PLATFORM are as follows:

(1) Performance based design concept is fully applied.

(2) As a hierarchy to define performance requirement, the structure of purpose – performance requirement – performance criteria is applied: the performance criteria shall be a design target and have to be defined in a quantitative manner. The purpose and the performance requirement shall be specified in a qualitative manner and must endorse the contents of performance criteria.

(3) The performance criteria, to be a design target, shall be defined by four factors: limit state, actions and environmental influences, time and significance of structures. PLATFORM emphasizes to consider time or alternation due to elapse of time throughout design service period. In this scheme, all design factors, in resistance as well as in actions, shall be defined as a function of time. The current design codes, mainly due to limitation of technology, define several design situation such as persistent, transient or accidental. This scheme enables designers to deal with all situations consistently throughout design service period.

(4) PLATFORM recommends a partial design factor method, which agrees with ISO2394.

(5) Terminologies related to structural design are defined by referring to internationally or domestically accepted codes.

(6) An action combination is a remaining issue, which needs further discussions.

4. Conclusion

PLATFORM, which is achieved by two years' contribution by committee members, will be introduced in Japan and overseas for discussion on design code. The code is literally expected to be a "PLATFORM" in discussing the system or hierarchy of structural design code in Japan, further more Asia or other regions.

During the earlier phase of the discussion, PLATFORM has been called "a comprehensive design code": however, it was renamed to PLATFORM and is going to be released with the name. The wording of "design code" might imply that another code has been developed, but in fact PLATFORM specifies simply design concept and the framework of design code. Thus, in order to avoid misleading, it was renamed to PLATFORM.

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References

1) ISO: ISO2394 General principle on reliability for structures 3rd edition, 1998.6
2) ISO: ISO13822 Bases for design of structures – Assessment of existing structures 1st edition, 2002.12
3) CEN: Eurocode: Basis of Structural Design, Draft prEN1990, 2000.