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Comparison with Russian Code

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Vladimir Raizer, born 1936 get his civil engineering degree in 1958 in Moscow State Civil Engineering University,his candidat of sci degree in 1962, doctorial degree in 1971 in TSNIISK member of JASS, JSO TK/98,published 5 books, more then 100 articles in structural mechanics and theory of reliability.

Summary

The aim of this manuscript consists of analysis of Eurucode 1,Part 1 Basis of Design (ENV1991,Part 1) from the position of russian engineering expirience and comparison with Russian Building Code (GOST 27751-88) "Building Structures and Foundation Bases.General Principles of Design".The observations are given for all sections of ENV1.

1.Section 1.General remarks.

This ENV 1 was elaborated on the base of ISO ST 2394 and one saw no difference in principle between them. But ENV1 is intended for practical use.It is important to pay attention that in former USSR the General Building Code based upon limit state design method in the form of partial factors was in action since 1955.Some years later it was performed in SMEA standart (SMEA ST-384-76) and was used in former SMEA countries.

One can note that as in ENV1 and as in GOST there is formulation lacking in precision for general conception of codifing procedures.The rules for requirements formulation to structures are ruther wordy.It is prescribed that a structure shall be designed in a such a way that it will during intended life with appropriate degrees of reliability to fulfill its function.For realisation of this prescribtion the method of partial factors is proposed.In this method a verification of limit state condition is caring into practice in one only point of state space.In this point all initial values will take design values.

So that a design with appropriate degrees of reliability is now only unattainable wish though in the main text and in the annexes there are so many general reasonings.It was proposed that a choice of partial factors values can be maked in such a manner that satisfaction of design enquality will quarantee a necessary reliability level.

Bat this assumption remains as hypothesis only.

It was said in Annex A that most of partial factors in ENV1 have been received on the base of constructional expirience and all necessary calibration procedures in the main text are absent.

In 1994-1995 in the process of elaborating of new version of Russian Building Code it was stated that partial factors method can't guarantee a design with given level of reliability.
GOST and ENV1- the designing requirements determined and precribed rules of analysis.In the same time requirements to the results of constructional work are almost absent.
But as a building structure is erecting for guarantee of function for technological process therefore a main requirement for structure must be consumer's requirements.
It was stated in Russia in 1994 the conception of consumer's requirements codification as a next step in new version of GOST.

2.Section 2 Requirements.

There are some problems with design working life.There are not such indications in GOST.
The procedures of partial factor method does not include time as design variable value and so that analysis of structures is fulfilling without considering working life.It is useful to note also that a working life is not defining by the class of structures as in ENVI but with technological process and will be determined by custumer.

3.Section 3 Limit states.

It is possible to state that the definition of design code making procedures are done more legible in ENV1 then in GOST.In GOST this procedure called "Limit state design method" that differed from "Partial factor method" in ENV1.But a conception of limit states then there is precise border between safe and unsafe regions can be consider in ENV1 as a general base for development of probabalistic method.

4.Section 4.Action and enviromental influences.

Introduction of two characteristic values-upper and lower for permanent actions in ENV1 gains an advantage over GOST.According to the GOST two design values can be determinating for these actions.The lower values are introducing then their unloaded influence is taken into account.

5.Section 5 Material properties.

Two characteristic values for properties introduction in ENV1 seems to be unnecessary.
There is no practical use in upper values.If it is necessary two design values can be introduced,for soil for example.

6.Section 6 Geometrical data.

This section consists no necessary information.In GOST it is absent.

7.Section 7.Modelling for structural analysis and resistance.

For this section one remark can be written.The point 7.2(2) affirmes that it is necessary to take into consideration the influence of deformation scheme of structure if it result in an increase of the load effect by more them 10%.But for numerical estimation of this increasing one must analyse the structure taking into account deformation scheme .

8.Section 8.Design assisted by testing.

It is very important to include this section into main document.There is not such section in GOST.

9.Section 9 Verification by the partial factor method.

This section is basic in ENV 1.In the partial factor method,it is verified that,in all relevant design situations,the limit states are not exceeded when design values for actions,material properties and geometrical data are used in the design models".The same deterministic approach is used in GOST.This approach does'nt allow to design a structure with given level of reliability.It is impossible to find a correspondence between numerical values of partial factors and level of reliability.From this condition it seems that there are too many partial factors in ENV1.It is impossible to combine incompatibility - to create the probabalistic baye under deterministic partial factor method.

10.Annexes.

There are four Annexes in ENV 1.All of them are informative and very useful for code making procedures Annex A present an approach for probabalistic base of partial factors method.but proposed procedures are possible for structure which consist of one element under one.But there is no answer about multyelements structures and load combination factors.

11.Conclusion.

Analysis of ENV1 shows that its theoretical base and code making procedures corresponds to GOST but in these both documents one can't find the result from reliability theorie and new approach in code making procedures based upon consumer requirements which have been proposed by EEC UN.But this problem is for new generation of building codes.

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