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Design of Reinforced Concrete with Eurocode 2

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Abstract : The rules implemented in Europe regarding structural design are termed Structural Eurocodes and deal with the several materials available for construction. Particularly regarding the very used in Europe concrete with steel reinforcement, it is named the Eurocode 2 – Design of Concrete Structures, usually known as EC2. The need of tables and abacuses to help in the design of reinforced concrete was due to the fact that the evolution and the study of new procedures and higher strength concrete showed that the previous tables needed to be improved. Reinforced concrete structures have particular aspects in the design that come from the nonlinear behavior of the concrete and steel and, in the case of concrete, also by the very low tensile strength. The design of reinforced concrete structures is made in terms of evaluating the ultimate strength and how it behaves under service conditions. As a matter of fact, the use of higher-strength concrete and steel classes showed that these serviceability design that was important for prestressed structures may be relevant in reinforced concrete structures. For these aspects, there are tables and design charts used for the ultimate limit design of reinforced concrete sections under bending moments and axial forces, and also auxiliary design diagrams able to evaluate the stress of the steel and the concrete at a section and the ductility for service limit states verification. For practical use, here are presented tables and design charts for the ultimate limit design of reinforced concrete sections and also auxiliary interaction diagrams for verification of the serviceability conditions. These kinds of aid for design were only available to engineers before the development of computers and, nowadays, yet an important tool in the universities for the students' use. Usually, in the reinforced concrete design, it is needed to obtain the area of the steel longitudinal reinforcement to be placed in the structure. The quantity and the position of the steel area may have different solutions and these tables and abacuses permit to obtain many possibilities in order to optimize the solution in economic or ductility terms.

Keywords : design examples, Eurocode 2, reinforced concrete, section design
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