Comparison of EC8-Part 1 with the Greek Seismic Code (EAK2000) with Emphasis on the Design of Reinforced Concrete Buildings

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ABSTRACT

Until recently, the only available codes for the analysis and design or Reinforced Concrete (RC) buildings in Greece were the Greek Code for Concrete (EKOS2000) [1] and the Greek Seismic Code (EAK2000) [2]. The use of the seismic code is compulsory in the country due to its high seismicity. These two codes have been used extensively for the analysis and design of RC structures and buildings in the country during the last years.

By March 2010 the EN Eurocodes are mandatory for the specification of European public works and are intended to become the de facto standard for the private sector. The Eurocodes therefore replace the existing national building codes, although many countries had a period of co-existence. At present take up of Eurocodes is rather slow on private sector projects and existing national codes are still widely used by engineers, especially in Greece.

Nowadays, the Eurocodes are fully available in Europe and also each country has published its National Annex which describes the values of the Nationally Determined Parameters (NDPs), which are parameters that can be adjusted specifically by every country. Eurocode 2 (EC2) deals with the "Design of concrete structures", while Eurocode 8 (EC8) is about the "Design of structures for earthquake resistance". Each Eurocode consists of various parts, for a specific use. The equivalent Eurocode part for EKOS2000 is Eurocode 2 – Part 1-1 (EC2-1-1) "General rules and rules for buildings" [3] while the equivalent Eurocode part for EAK2000 is Eurocode 8 – Part 1 (EC8-1) "General rules, seismic actions and rules for buildings" [4].

The purpose of the present study is the comparison of EC8-Part 1 with EAK2000 with emphasis on the analysis and design of RC buildings. A detailed comparison is attempted on an article-by-article basis, where the similarities and differences of the two codes are emphasized. Comparisons are made in terms of the basic assumptions, response spectra, structural regularity criteria, analysis methods, structural systems, values of the behavior factors for RC structures and many others. Finally, a real-scale RC structure is modeled, analyzed and designed with both codes using the program FESPA v5.1.0.2 from LH Logismiki and the various differences in the analysis and design results are reported and investigated.

References

[1] Greek Code for Reinforced Concrete - EKOS 2000 (in Greek), Organization for Earthquake Resistant Planning and Protection (OASP), Ministry of Environment Planning and Public Works, Greece, 2001

[2] Greek Seismic Code - EAK2000 (in Greek), Organization for Earthquake Resistant Planning and Protection (OASP), Ministry of Environment Planning and Public Works, Greece, 2001

[3] Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings, EN 1992-1-1:2004: E, CEN, 2004

[4] Eurocode 8: Design of structures for earthquake resistance - Part 1: General rules, seismic actions and rules for buildings, EN 1998-1:2004: E, CEN, 2004.