

INTRODUCTION

In engineering practice, the application of the theory of calculations of reinforced concrete structures is currently undergoing significant changes. Since 2011. ДБН В.2.6-98:2009 [1] and ДСТУ Б В.2.6-156:2010 [2] were put into effect, which regulate the new regulatory framework in the field of reinforced concrete instead of that used since 1986 according to СНиП 2.03.01-84* [3]. The main advantages of the new regulatory documents are gradual adaptation to the existing regulatory framework of the European Union, reflecting the results of the latest technologies and achievements of both national and international experience in the design of concrete and reinforced concrete structures in the construction industry in recent years. The purpose of their application is updating the national regulatory framework in accordance with the modern tasks of the construction industry, harmonization with international and European norms and standards on the regulatory system in the field of construction, creating the opportunity to take into account in Ukraine the international experience in the design of concrete and reinforced concrete structures.

According to current standards, calculations of the strength of concrete and reinforced concrete structures are performed on the basis of a nonlinear deformation model [1. 2]. This approach is due to the fact that the previously applied method described in the repealed norms [3] had the following disadvantages:

– calculation of the strength of elements of concrete and reinforced concrete structures led to an overestimation of their bearing capacity; – the design schemes for the operation of reinforced concrete elements in the state of destruction significantly differed from the actual ones, namely, the stresses in the concrete and reinforcement on the neutral axis are not equal to zero, which was a consequence of the applied premise on the uniform distribution of stresses in the concrete of the compressed zone; – strength calculations did not take into account the properties of concrete to deform beyond the line of reaching its ultimate strain values ε_{c1} (ε_{cR}); – strength calculations had to be distinguished for cases with normal reinforcement and cases with excessive reinforcement.

The enacted regulatory documents [1. 2], developed by a team of scientists of the state enterprise

“State Research Institute of Building Structures”, almost eliminated these shortcomings. This became possible due to the use of the non-linear diagram of concrete deformation in the strength calculations of concrete and reinforced concrete structures.

The possibility of operation of reinforced concrete structures below the limit of ultimate strains was discovered in the experiments of Professor Mersch on compressed columns. The introduction of the nonlinear deformation model into the strength calculations of concrete and reinforced concrete structures is based on the results of a large number of further experimental and theoretical studies [4–74]. Among them, a significant part of the work was carried out under the guidance of such famous scientists of Ukraine as A. Ya. Barashikov, E. M. Babich, A. M. Bambur, P. F. Vakhnenko, B. G. Gnidets, O. B. Golishev, S. Dorofeev, S. V. Klimenko, S. F. Klovanych, L. I. Storozhenko, M. V. Savitsky, M. S. Toryanik, S. L. Fomin, O. L. Shagin, V. S. Shmukler, V. G. Shelkunov, O. F. Yaremenko, as well as many other scientists.