THE FINITE ELEMENT METHOD ANALYSIS OF REINFORCED CONCRETE STRUCTURES WITH ACCOUNT FOR THE REAL DESCRIPTION OF THE ACTIVE PHYSICAL PROCESSES

It is well known, that buildings and their bearing structures are subject to ageing, including corrosion, deterioration, etc. When faults in bearing structure are detected, disposal-at-failure maintenance should be made. But before that, it is necessary to assess the rate of deterioration.

The author suggests to use finite element method for calculation of the safety margin of reinforced concrete bearing structures, because the finite element method is widely used in engineering practice of structural design. In the process of engineering inspection of reinforced concrete structures all defects of the inspected structure should be clearly specified. The article suggests to create the FEM-Model of the inspected structure in view of the fact that this structure is defected. In order to achieve this effect, the stiffness matrix of some finite elements should be changed and the FEM-Model must be created of volumetric finite elements (the article speaks about eight-node parallelepiped elements).

At first the FEM-Model will be created of eight-node parallelepiped elements with standard descriptions for the reinforced concrete; then finite elements in damage area must be changed. On the basis of integral estimation of the mode of deformation, deformation ratio will be calculated, which is essential for the description assignment of the changes in stiffness matrix. The formulation of the deformation ratio includes all the possible defects of structure through indexes, which must be analytically calculated depending on the concrete defect.

The method described in the article is useful in the process of engineering inspection of the reinforced concrete structures. Using this method can sufficiently specify the safety margin of a defected structure and forecast the future operational integrity of this structure under the acting load.

**Key words:** inspection of load-bearing structures, finite element method, calculation of bearing capacity, reinforced concrete structures, stiffness of a structure, stiffness matrix.

**References**


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