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APPROACHES FOR ESTIMATION OF THE NEED OF REHABILITATION OF EXISTING BUILDINGS, ACCORDING TO DIFFERENT REGULATIONS

Anton Gorolomov

Abstract: This article shows the methods of estimation the existing buildings and making the conclusion of need for their rehabilitation. Different regulations (Eurocode 8-3, Bulgarian regulations, American regulations (FEMA pre-standards)) give different approaches for estimation the vulnerability of the existing buildings and give different requirements for modeling the seismic response. The differences are shown and some comments are done to show the practical problems of using the mentioned approaches.

APPROACHES FOR USING PUSHOVER ANALYSIS FOR ESTIMATION OF THE NEED OF REHABILITATION OF EXISTING BUILDINGS

Anton Gorolomov

Abstract: This article shows the specifies in using the pushover analysis and its applications in the estimation of existing buildings. The N2 method is explained as the recommended method in Eurocode 8-3. Some methods for finding a behavior factor using pushover analysis are shown. When the behavior factor is calculated a modal and spectral analysis can be done using this more accurate value of the behavior factor.

CALCULATION OF THE IN-PLANE STIFFNESS OF A MASONRY WALL, STRENGTHENED BY VERTICAL FRP STRIPES

Anton Gorolomov, Anita Handruleva, Petar Grekov (

Abstract: A formula for calculation the in-plane stiffness of a masonry wall, strengthened by vertical (and if needed horizontal) FRP stripes is investigated in this study. This formula can be used in computer modeling of such structures – definition of bending stiffness modifiers.

ADMISSIBLE STRESSES AND STRAINS IN FRP STRIPES, APPLIED TO STRENGTHEN MASONRY ELEMENTS

A. Gorolomov, A. Handruleva, P. Grekov

Abstract: The admissible strains in FRP (fiber reinforced polymers) stripes, applied to masonry, is one of the most important issues, related to the design of the strengthening system. In the following article can be seen a comparison between the experimental data from all over the world and the theoretical calculations, according to three standards – the Italian CNR-DT 200, its newer version CNR-DT 200/R1 and the American ACI 440.7R-10.

ACCIDENT WITH TIMBER COLONNADE OF THE 200 YEARS OLD CHURCH AND METHODS FOR THE STRENGTHENING

Petar Grekov , Anton Gorolomov , Doncho Partov , Bohumil Straka , and Radoslav Nikolov

Abstract: The article describes an accident in colonnade of the 200 years old church, “Sv. Uspenie Bogorodichno” in Kyustendil. The article has investigated several interesting approaches to amplify damaged wooden columns in historical structures in China, Azarbaijan, Iran, Spain and USA. The decision was made to temporarily reinforce the whole structure of the church during its

renovation and the method of strengthening the damaged wooden columns in the church was propose.

STRENGTHENING THE DAMAGED WOODEN COLUMNS AFTER INVESTIGATING OF SEVERAL INTERESTING APPROACHES FROM ABROAD

Petar Grekov , Anton Gorolomov , Bohumil Straka , Doncho Partov

Abstract The article describes an accident in colonnade of the 200 years old church, "Sv. Uspenie Bogorodichno" in Kyustendil. The article has investigated several interesting approaches to amplify damaged wooden columns in historical structures in China, Azarbaijan, Iran, Spain and USA. The decision was made to temporarily reinforce the whole structure of the church during its renovation and the method of strengthening the damaged wooden columns in the church was propose. The church was built in 1816, and is made of stone walls and a wooden roof structure. It is built according to the traditions of the Revival Age in Bulgaria and consists of walls with stone masonry, wooden floor constructions for emporium, wooden beams and columns. The outside walls are made of brick stone with a thickness of 60-70 cm. The building of the church is on one floor with height to the emporite 3.30m, height to the roof of the church with H-2.40m, with double sided roof, made with wooden constructions and roofing: boarding, waterproofing and tiles and three drum wooden dome. According to the plan, the church is a dyed single-pseudo-three-nave pseudo-basilica with a wooden roof structure and geometric plan dimensions: 23,60m x 14,40m. The building of the church is executed from the outside with powerful stone walls, the upper end of which reaches the level: 3,30m. In the interior of the church there are 12 main wooden columns in the longitudinal and transverse direction, which reach the level of the floor structure on the first floor of the church (the emporium). In the longitudinal direction, the columns are axially spaced through: 3,70 +2,40 +2,90 +2,70 +2,60 + 3,03m. In the transverse direction, the columns located on the axes of the building B and B are at a distance of one another axially through 6,230m.

110 YEARS HISTORY OF SYNAGOGUE CONSTRUCTION IN THE CAPITAL CITY SOFIA IN BULGARIA

Anton Gorolomov, Vanyo Georgiev², Doncho Partov

Abstract: The paper make attempt to describe and analyse the complex construction of the 110-year old synagogue in Sofia using architectural and constructive documentation, developed at the Institute for Cultural Monuments in Sofia, in the late 1990s. During the second world war in 1944 a catastrophic bomb attack of the city of Sofia, provokes extensive damages in many masonry buildings and put at imminent risk the valuable historical and architectural heritage of the city. The condition of the structure of the synagogue after the bombing of Sofia in 1944 is described in detail. Additionally, the existing damages observed in the walls and vaults and the processes of corrosion observed in the steel roof are analysed after standing for 45 years (1944-1989) after the bombing and under the open sky. The approach of the specialists on the seismic vulnerability of the building at the moment of the introduction of the new earthquake regulation in Bulgaria in 1987 is thoroughly analysed. By taking into consideration the existing damages and the results of the analysis, a rehabilitation and a seismic retrofitting plan are proposed and applied by the application of innovative construction materials. The results of the numerical analysis are used as well to design a complex retrofitting system based on several techniques and giving the possibility to make the compromise between the safety and the conservation of building's historical characteristics, following in the same time the requirements of the national regulations.

STATICAL ANALYSIS OF THE TIMBER ROOF CONSTRUCTION FOR THE STORAGE HERITAGE BUILDING

Petar Grekov , Anton Gorolomov , Doncho Partov , Nikolay Tuleshkov , Miloš Drdäcký and Gaetano Pianese

Abstract: The building is a masterpiece of the industrial architecture in the thirties of XX century. The original design is the work of the architect Rudolf Fischer. The construction of the building is realized in the period 1924-1925. The combination of different construction materials: masonry, reinforced concrete and timber, gives a unique structure. This contribution introduces a structural investigation, using MFE software, into the stability and efficiency of the design of the roof truss of the storage heritage building in Kustendil. A two dimensional model was used in numerical analysis to discuss and highlight structural sense of Austrian architect R. Fischer in the period of 1925-1925. The modelling and the final conclusions are basic for the decision concerning the possible interventions in the building and the possibility to extend the service life of the roof structure

TIMBER ARCH SYSTEM DEVELOPED BY PH. DE L'ORME AND ITS APPLICATION IN THE HISTORIC AND CONTEMPORARY ROOF STRUCTURES

Petar Grekov, Anton Gorolomov, Doncho Partov, Bohumil Straka and Miloš Drdäcký

Abstract The paper presents some case studies which illustrate the different ways where the construction system proposed by de l'Orme can be used. In the field of timber structures his system is known as especially arched systems with mechanical joints. The contribution attempts to make analysis of several examples of wooden structures built, using the system invented by Philibert de l'Orme in 1561.

METHODS FOR STRENGTHENING OF WOODEN COLUMNS IN PRE-EMERGENCY STATE IN HISTORICAL STRUCTURES, AND CHOOSING THE ONE OF THEM FOR REINFORCEMENT OF THE SUPPORTING COLUMNS IN THE CHURCH "Sv. USPENIE BOGORODICHNO" IN KYUSTENDIL

Petar Grekov, Anton Gorolomov, Doncho Partov, Bohumil Straka and Radoslav Nikolov

Abstract The article describes an accident in colonnade of the 200 years old church, "Sv. Uspenie Bogorodichno" in Kyustendil. The article has investigated several interesting approaches to amplify damaged wooden columns in historical structures in Spain, China, USA and Iran. The decision was made to temporarily reinforce the whole structure of the church during its renovation and the method of strengthening the damaged wooden columns in the church was proposed.