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# CALCULATION OF REINFORCED CONCRETE SLAB STRUCTURE UNPROTECTED FROM SUNLIGHT IN NATURAL CLIMATE IN LIRA PK PROGRAM

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**Abstract**
The article provides information about the influence of natural climatic conditions on the design of buildings and structures. The author emphasizes that design and construction, taking into account the local climate conditions, based on the characteristics and functional requirements of the building or structure being designed, allows to find an effective solution. It is necessary to take into account various factors when designing the architectural construction solutions of the project object: i.e. air temperature, solar radiation, humidity, wind speed, precipitation. It is desirable to find a solution using modern technical means in the construction of new architectural forms, original planning projects.

**Keywords**. Natural climatic conditions, creation of a calculation scheme, research analysis.

## Introduction

The ability of this program to print the results in the presentational and various tabular forms makes it very convenient to compare the results of calculations carried out in different constructive systems.

Taking into account the above, it was this program that was used to conduct numerous experiments to check the compatibility of beamless and beam reinforced concrete frame systems with respect to local conditions, that is, seismic effects. During numerical experiments, based on the requirements of table 3.1, reinforced concrete frame systems of 3 different shapes and sizes without beams and beams were selected.

They are:

It is a rectangular, 24-meter-long, 18-meter-wide, 5-story building with a spatial monolithic reinforced concrete frame. Constructive solutions of the building:

• 60 cm thick base plate
• Columns – 40 x 40 cm. Concrete class B25;
• Beams-40 x 40 cm. Concrete class B25;

• Inter-floor and roofing slabs - 16 cm Concrete class B25;

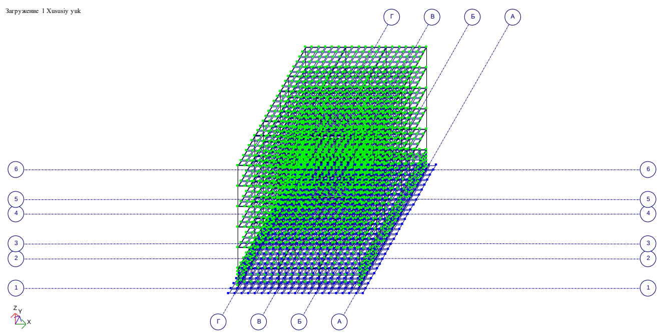


*Figure 1. Analytical view of the building*

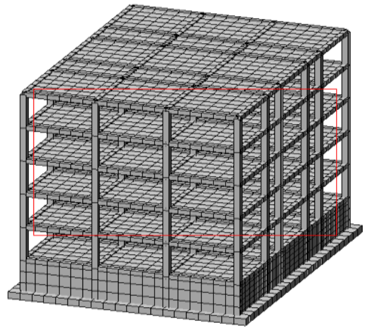


*Figure 2. Spatial model of the building*

In order to carry out numerical experiments, these structural systems were modeled as a spatial reinforced concrete frame in the Lira PK 9.6 program, and the following designations and simplifications were included in the transition from the real state to the computational model:

Cross-sectional surface of columns and beams of reinforced concrete frames - square, 400x400 mm; 400x400 mm;

In Lira PK 9.6 program, taking into account that the modeling of precast reinforced concrete slab causes certain inconveniences, instead of it, the function "Ob'edineniye peremeshcheniy" representing the effect of precast reinforced concrete slab in the program is used, and the weight of the precast concrete slab is used. included as freight. The loads in the building and the specific weights of the slabs are placed on the load-bearing beams (girders) taking into account the areas of influence;

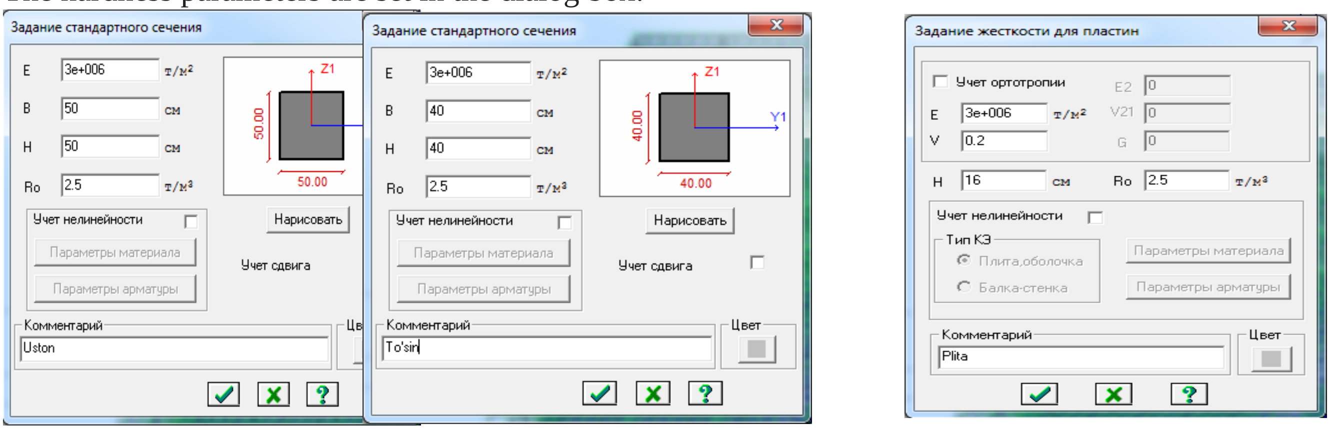
The program does not model the foundation and its interaction with the soil, and the study of this effect is not envisaged. Therefore, the models in the program are considered to be attached to a solid foundation, and its effects are included by limiting displacements and moments in all directions;

The height of each floor of the building is 3 meters.

The thickness of the considered reinforced concrete constructions and the dimensions of the cross-section surface are entered using the dialog window of the program " Жесткости элементов ".

*Figure 3-5. Element cross-sectional surfaces and uniformity a) column b) beam d) plate*

The hardness parameters are set in the dialog box:



- modulus of elasticity (E);
- geometric dimensions of the element section (b) and (h);
- specific weight of the material (Ro);

Compilation of calculation scheme, inclusion of properties of finite elements and parameters of seismic area. Loads affecting the constructions of the building were assumed to be the same for all types of buildings for the purpose of conducting numerical experiments. The standard and calculation value of loads was calculated in accordance with QMQ 2.01.07-96 - "Loads and effects".

In buildings, the values of the loads affecting the construction are the same. Due to the fact that the models of prefabricated intermediate plates were not created for the beam constructions, the load acting on the stem was applied to the load-bearing beams as a distributed force.

Therefore, from the amount of load affecting one square meter of the diameter, the value of the load affecting one meter of the length of the beam was calculated.[1]

Loads are included in the program, divided into several loads depending on the duration of exposure. The values of loadings and loads are as follows:

1-Load - Specific weight of constructions. In this case, the load reliability coefficient is equal to gf=1.1.

2-Load - the weight of the floor used in buildings and media. Based on the calculations, it is taken into account that the average is 0.2 t/m2 per square meter and the load reliability coefficient.

4-Loading Temperature effect on the building

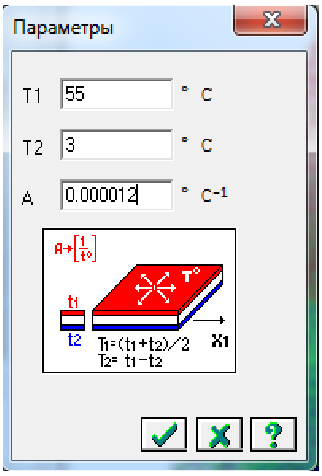



Figure 6. In the program, giving the temperature effect to the plate element dialog box

**The following values are set in the dialog box:**

T1 - uniform temperature heating (cooling) in thickness;

T2 is the temperature difference between the upper (along the Z1 axis) and lower (against the Z1 axis) surfaces;

A is the coefficient of thermal expansion of the material.

The values of T1 and T2 can be calculated using the following formulas:

**T1=(t1+t2)/2; T2=t1-t2,**

t1 is the temperature on the upper (along the Z1 axis) surface of the plate;

t2 is the temperature on the lower (against the Z1 axis) surface of the plate.

If T2 = 0 (t1 = t2), then the plate undergoes uniform heating throughout its thickness.

4-Load - seismic force acting along the X-axis.

5-Load - seismic force acting along the Y-axis.

The formation of seismic loadings and the introduction of parameters of the seismic zone are carried out in three stages.

Construction and floors of buildings designed for seismic areas, taking into account seismic effects. is considered the cumulative effect of the main and separate loads. The main summation of loads and effects (sochetaniye) is determined from the "Loads and Effects" section of the QMQ, and separate summaries that take into account seismic effects are determined from this document. In this case, the value of accounting loads is multiplied by the aggregation coefficient obtained from table 2.1. [1-4]

Stage 1. Formation of dynamic loads from static loads. At this stage, it is considered that the value of seismic force is calculated by the weight of buildings and structures and the values of static loads located in them, as mentioned above. In this case, using the "Formirovanie dinamicheskix zagrujeniy iz staticeskix" dialogue window of the program, based on the duration of the impact of each static load, the corresponding coefficient is entered into them.

The value of the coefficient is given in table 2.1 of QMQ 2.01.03-96 "Construction in seismic areas":

Table 2.1

| Cargo types | Aggregation coefficient |
|---|---|
| Permanent | 0,9 |
| Long term temporary | 0,8 |
| Short-term (intermediate and roofing) | 0,5 |

We consider displacements resulting from seismic forces in reinforced concrete structures using the function of graphically printing the results of the Lira PK 9.6 program.

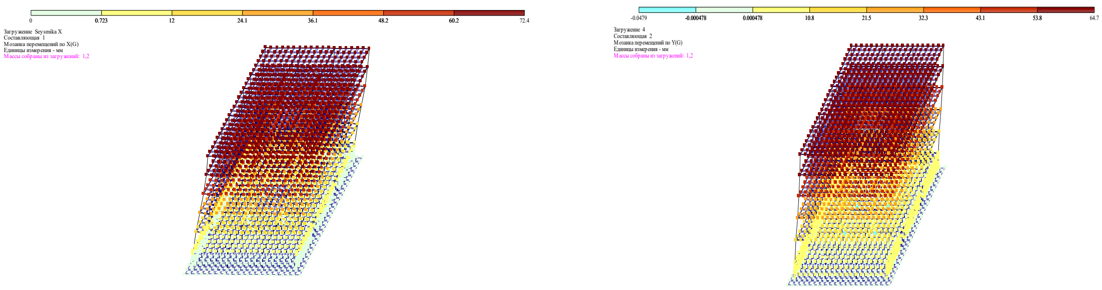


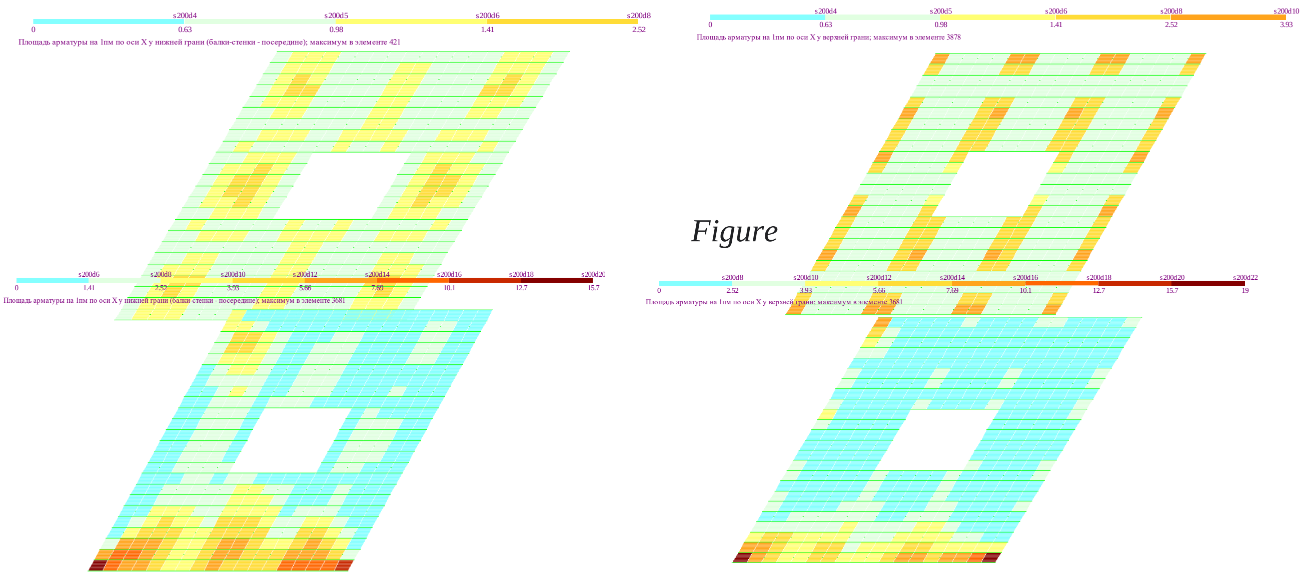
*Figure 6.7. X and Y displacements of a 5-story building under the influence of natural climate*

The above results can be summarized and expressed in the following table:

Table 2

| № | Structural system and dimensions of reinforced concrete frame | Maximum displacement in the X-axis direction, mm | The maximum displacement in the Y-axis direction, mm |
|---|---|---|---|
| 1 | Axial displacements of a 5-story building under the influence of natural climate due to static and dynamic loads | 72.4 | 64.7 |

**Comparative analysis of slab construction on the 4th floor of a 5-story building exposed to natural climate**.



*Figure*

*7.8. Consumption of reinforcements along the X-axis of the plate*

*Figure 9, 10. (under the influence of temperature of 55°C) Consumption of reinforcements along the X-axis of the plate*

**General conclusions**

1. In the results of the research, it was confirmed that the elements of the reinforced concrete structure are subject to the uneven distribution of temperature along the cross-sectional surface, the season of the year, and sudden changes in temperature and humidity during the day.

**2.** The calculation results of the mathematical model created in the LIRA PK program for reinforced concrete structural elements of natural climatic conditions were determined and compared.

**3.** Deformation and stress indicators of the concrete of the object not protected from the sun's rays and the construction was not completed. The results were obtained for the temperature of the concrete at 550C at the air temperature of 400C. [5]

**4.** Numerous researches conducted and obtained results show that the need to take into account the negative impact of climatic conditions on the condition of the construction during the design of reinforced concrete frame buildings built on the territory of our Republic, which has a dry hot climate, has been studied and proven in practice. For this purpose, it is necessary to take into account the effect of temperature along with seismic forces when calculating the building.

**LIST OF REFERENCES**


1. Abdurahmonov, A.A. (2022). Characteristics of the influence of the climate conditions in the design of buildings and consrtuctions
2. Davlyatov , S. M., & Abdurahmonov , A. A. o‘g‘li. (2023). SILINDRIK QOBIQLAR MODELLARINI MARKAZIY SIQILISHGA SINASH METODIKASI. *GOLDEN BRAIN*, *1*(1), 268–270. Retrieved from https://researchedu.org/index.php/goldenbrain/article/view/4570Мирзияев Ш.М. PF-5963-сон 13.03.2020. PF-6119-son 27.11.2020da
3. Махмудов, З. Б. (2023). СПОСОБ УСИЛЕНИЯ МОНОЛИТНОЙ ЖЕЛЕЗОБЕТОННОЙ РАМЫ КАРКАСА ПРОИЗВОДСТВЕННОГО ЗДАНИЯ. Ломоносовские научные чтения студентов, аспирантов и молодых ученых–2023, 435.
4. Mirzababaeva, S. M. (2022). SOLUTIONS OF WOOD STRUCTURED BUILDINGS IN THE CONSTRUCTION OF THE SMART CITY. Journal of Integrated Education and Research, 1(5), 390-395.