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METHOD OF DEFINING THE NEW BUILDING PROJECT SPACE IN THE EXISTING BUILDINGS

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In the article, the algorithm of defining the maximum shadow masks MSM of project space using calculation point method. Defining the algorithm of insolation calculation for construction project space of new building makes design process simpler.

Key words: maximum shadow masks, calculation time of insolation.

Formulation of the problem. Before the designer, the customer asks about the maximum use of the site for the construction of a new home. The designer must comply with regulatory requirements and rules, in particular regarding insolation. To calculate the normalized duration of insolation there is a large number of methods for solving individual problems of insolation. Therefore, the question arises in the development of a complex algorithm through which you can consistently make the necessary calculations to determine the normalized duration of insolation to construct the design space of a new home and further design of the house in the selected space without violating the rules of insolation.

Analysis of recent research and publications. The definition of the possible height and configuration of a new building in existing building was proposed in [2]. The method is based on the definition *maximum shadow mask* (MSM) the design space that corresponds to the maximum possible markings of points of the orographic surface, under which the insolation mode of the calculated point (RT) in the premises of an existing building or adjoining territory meets the regulatory requirements or does not deteriorate in the normalized period of insolation. The general scheme for determining the design space for different types of houses, depending on the purpose was considered in [3]. Types of houses in accordance with the normative requirements for insolation were considered in [4].

Formulating the goals of the article. To propose an algorithm for determining the design space of a new building using the RT method, provided that it does not violate the regulatory requirements for insolation of premises in existing buildings and adjoining territory.

Main part. Before the start of calculations, an analysis of the source data for the design is carried out. Collected data on the current state of the site, surrounding construction, design problems, master plan, floor plans, sections and facades of surrounding houses and those already under

construction on the adjacent territory or whose construction is planned [0,4,5,6].

To construct the design space of a new building, it is necessary to choose a method for determining the estimated duration of insolation for objects with different insolation requirements:1) будівлі, приміщення в них та прилегла територія, в яких нормується тривалість інсоляції;

2) buildings, premises in them and adjoining territory, in which the duration of insolation is not normalized;

3) buildings, premises in them, in which insolation is unacceptable.

An analysis of the possible configuration and height of a new building is based on the construction of possible maximum shadow masks of a new home or design space.

In the presence of sketch drawings of a new building consisting of K sections, determining the options for combining the maximum possible heights of its sections $H_{n,k}$ (n =1,2, ..., N – combination option, k =1,2, ..., k – section number) is carried out on the basis of the construction of the MTM new building.

The general plan defines the provisions PT_i (i =1,2, ..., I) based on the analysis of light transitions, their configuration, volume-planning decisions, orientation and regulatory requirements for insolation of surrounding buildings and adjoining territory.

For each one PT_i are being built $TM_{i,j}$ existing situation without taking into account new building.

Next, possible MTM for each PT_i taking into account the new home creating different options MTMi,j (j =1,2, ...,Ji), which determine the maximum height of sections. To do this, on a solar map along the trajectory of the sun, which corresponds to the estimated moon, determine the segment corresponding to the normalized insolation time starting from the right boundary $TM_{i,j}$. Conduct a horizontal angle of instability α with center y PT_i, which corresponds to the interval of normalized insolation time. Within the corner of α, the building will have a limited height. The rest of the house, outside the horizontal angle α, will be unlimited height. Thus, the first one is formed MTM_i, which is determined by a conical surface with a vertex y PTi according to the calculated directions of insolation i_k . On the map a curve that passes through the points of a break, which limits the height of the section and indicates the maximum vertical angle of insolation, is formed. βi. Maximum marks of the possible height of the section that belongs to the house, for ГППi are determined by the intersection of the conical surface with the corresponding vertices.

Then move the segment of normalized insolation time every 10 minutes. forming a new MTM. This process is consistently repeated for each PT_i, and for each subsequent one PT_i take a combined shadow mask,

supplemented by the maximum shadow masks of the previous sections. It is thus formed $MTM_{i,1}$ fig. 1.

For each option $MTM_{i,j}$ the maximum height values are determined $H_{i,j,k}$ each section. All these combinations of heights of sections form a zero-level group GR_0.

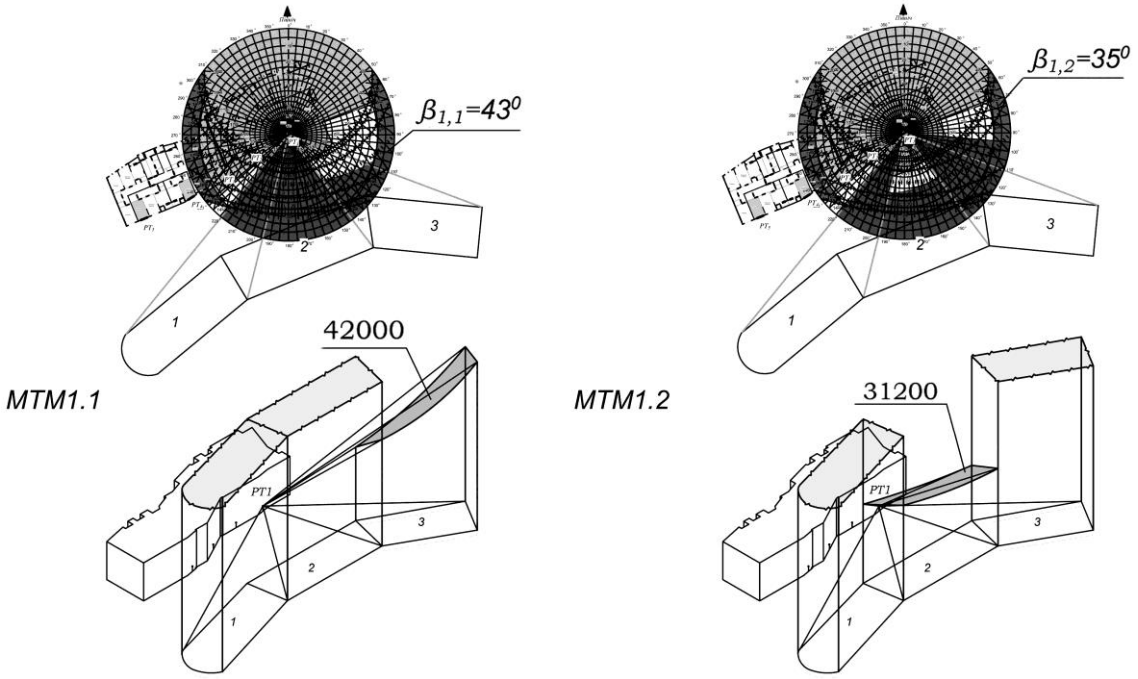

Fig. 1. Determine the maximum height values for sections PT_1 y GR_0

In the zero-level group, the maximum heights of each individual section are determined $H_{i,k}$ = max($H_{i,1,k}$, $H_{i,2,k}$, ..., $H_{i,ji,k}$) and then the maximum possible height value H_k = max($H_{1,k}$, $H_{2,k}$, ...,$H_{I,k}$) section that will satisfy the conditions of insolation of all PT*i*. In $ГР_0$ all values of heights $H_{i,j,k}$, which is larger than the corresponding value *Hk*, are replaced by H_k. Options for combining heights in PT*i*, which are repeated, are removed from $ГР_0$ утворюючи $ГР_1$. Next upgraded $ГР_0$ утворюється наступна група першого рівня $ГР_2$. This process continues while in $ГР_0$ all values $H_{i,j,1}$ will not become the same. It is thus formed N_1 groups of the first level. Under the same algorithm, groups of the second level are formed $ГР_{i,1}$, $ГР_{i,2}$, ..., $ГР_{i,N}$, having the same values of section height. Similarly groups of third, fourth and subsequent levels are formed (fig. 2). The number of levels is equal to the number of sections. Each last-level group has only one option for combining section heights.

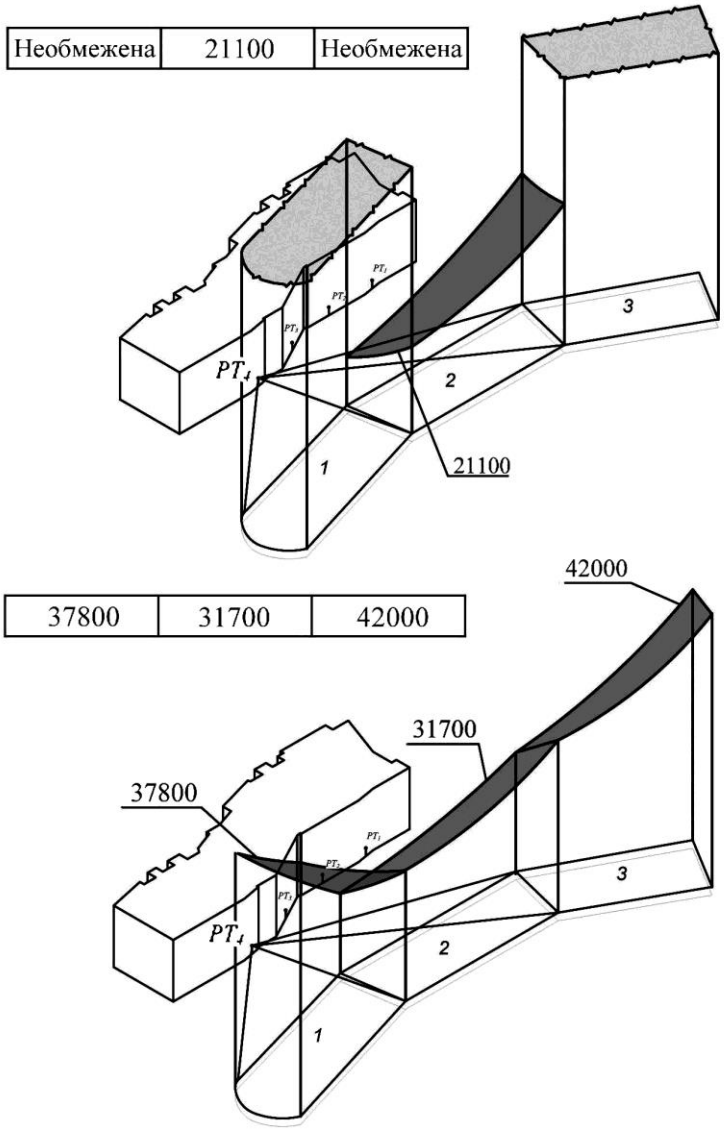

Fig. 2. Options for combining the highest possible sections height

Among the options available, one chooses the one that best suits the architectural concept of the new home.

Conclusions. The proposed algorithm for determining the design space of a new building makes it possible to use existing methods of calculations of insolation at the initial stage of designing. Using the algorithm facilitates work on the project. You only need to follow the sequence of calculations when choosing one or another method of resolving the configuration of a new home.

Literature

1. Державні санітарні правила планування та забудови населених пунктів: ДСП 173. [Затверджені наказом МОН України від 19 червня 1996 р.] / МОН України. – К. : МОН України, 1996. – 65 с. (Державні санітарні норми України).

2. Настанова з розрахунку інсоляції об’єктів цивільного призначення : ДСТУ-Н Б В.2.2-27:2010 / Мінрегіонбуд України. – К.: Укрбудінформ, 2010. – 81с. – (Національний стандарт України).
3. Андропова О.В. Алгоритм визначення проектного простору нового будинку в існуючій забудові з умов дотримання інсоляційних норм / О.В. Андропова // Технічна естетика і дизайн: між від. наук.-техн.зб. – К.: КНУБА, 2010 – Вип.7. – С. 231-237.
4. Андропова О.В. Класифікація будинків і споруд за вимогами до норм інсоляції / О.В. Андропова // Науково-технічний збірник «Енергоефективність в будівництві та архітектурі» / відп. ред. П.М. Куліков. – Київ.: КНУБА, 2017 – Вип. 9. – С.11-16.
5. Андропова О.В. Визначення обмежуючих умов для побудови схеми розрахунку інсоляції при пошуку форми нового будинку в існуючій забудові / О.В. Андропова // Прикл. геометрія та інж. графіка: між від. наук.-техн.зб. – К.: КНУБА, 2009 – Вип.81.
6. Планування і забудова міських і сільських поселень: ДБН 360-92** / Мінрегіонбуд України.– К.: Укрбудінформ, 2002. – 136с. – (Державні будівельні норми України).

МЕТОДИКА ОПРЕДЕЛЕНИЯ ПРОЕКТНОГО ПРОСТРАНСТВА НОВОГО ДОМА В СУЩЕСТВУЮЩЕЙ ЗАСТРОЙКЕ

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В работе рассматривается алгоритм определения максимальной теневой маски проектного пространства с использованием метода расчетной точки. Определение алгоритма расчета продолжительности инсоляции для построения проектного пространства упрощают процесс проектирования нового здания.

Ключевые слова: максимальная теневая маска проектного пространства, расчетное время инсоляции.

МЕТОДИКА ВИЗНАЧЕННЯ ПРОЕКТНОГО ПРОСТОРУ НОВОГО БУДИНКУ В ІСНУЮЧІЙ ЗАБУДОВІ

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У статті розглядається алгоритм визначення максимальної тіньової маски проектного простору при використанні методу розрахункової точки. Визначення алгоритму розрахунку тривалості інсоляції для побудови проектного простору спрощують процес проектування нового будинку.

Ключові слова: максимальна тіньова маска проектного простору, розрахункова тривалість інсоляції.