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ON THE ISSUE OF DESIGNING ARCHITECTURAL SHELLS OF DOME-TYPE COATINGS

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Annotation: In this scientific article, research was conducted on methods of mold preparation for dome-shaped enclosures. In addition, issues of implementation of construction and installation work were considered.

***Keywords*:** Cupola, shells, hemisphere, axis symmetry, construction, design, technology, ring, composition, functional.

The task of designing dome-type shells is still of interest, the presence of pieces of a single type on the surface makes it possible to carry out their factory production and installation at the construction site.

The determination of the same type pieces of a spherical shell, docked in various combinations, makes it possible to obtain new shells that satisfy predetermined conditions of a compositional, functional, planning, design and technological nature.

The use of computer design allows you to freely vary the shape of the composite shell and obtain shells that meet the conditions of aesthetics, optimality, and others.

The use of dome-type shells in construction in quantitative and qualitative terms can be greatly developed since there were theoretical foundations for determining their bearing capacity, methods for calculating the forces arising from their efforts and creating technological prerequisites for improving the technical and economic indicators of their construction.

The development of these dome-type shells is due, firstly, to the numerous useful technical and technological qualities of their structural forms, and secondly, to a lower material consumption compared to other dome-type shell designs.

The development of dome-type shells can be illustrated by examples of the construction of domes, tanks of various kinds, towers, and others.

We can get a beautiful composite shell with a square plan, if to one spherical shell cut out along a square we attach pieces of other spherical shells cut out along a right triangle. (Fig.1.)

If the hemisphere of radius is R given by the equation:

$Z = \sqrt{R^2 - x^2 - y^2}$ Here X=L_1, Y=L_2, L_1 and L_2-cut the dimensions with a straight prism with a square base, then we will cut a spherical shell with a square plan. The radius of the circular edges of this shell is calculated by the formula:

$Z = \frac{R}{\sqrt{2}}$, here R is the radius of the hemisphere.

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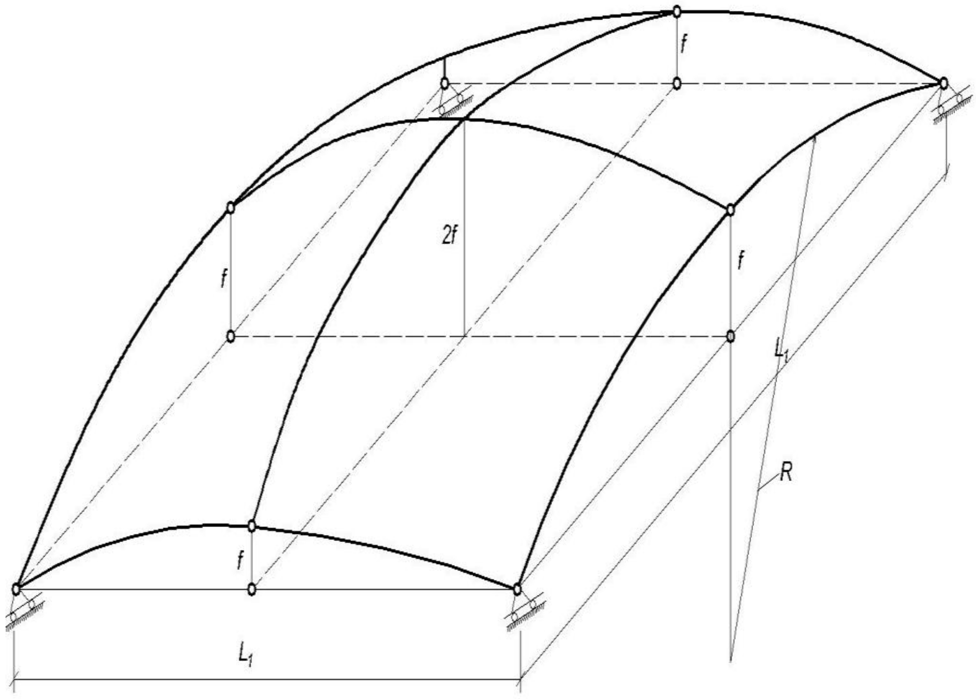

Рис.1

Here f is the reach of the arrow.

An analysis of the development of structural forms of axisymmetric shells of dome-type roofs made of reinforced concrete (including prestressed) allows us to draw the following conclusions:

at present, reinforced concrete shells of dome-type coatings can be made with a diameter of up to 100 m, a height of up to 300 m, the ratio of wall thickness to radius in them can be taken up to 0.002,

When erecting a structure of axisymmetric shells on a dome-type coating of a large area, it is possible to choose an erection technology that uses the principle of repeatability of the constituent elements of the form, which makes it possible to form structures in separate sections and thereby reduce the cost of manufacture.

When erecting shells of dome-type roofs, first make a support ring, then mount the survey elements of the dome shell. This reduces the material and monetary costs and the construction period.

Summarizing the above, we can draw the following conclusions. Axisymmetric loads can cause significant moments and unevenly distributed displacements in dome-type shells. This also applies to axisymmetric temperature effects. More complete studies can usually be performed only with the help of computer-aided design. Shells subjected to symmetrical effects of low intensity, for which there is no exact solution, should be reinforced, focusing at least on the possible bending state.

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