

VILNIUS GEDIMINAS TECHNICAL UNIVERSITY

Faculty of Civil Engineering

# **Modern Building Materials, Structures and Techniques**

## ABSTRACTS

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## SOME STRUCTURAL POSSIBILITIES TO DECREASE THE COMPLIANCE OF SADDLE SHAPE CABLE STRUCTURE

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Full paper on enclosed CD-ROM

### Keywords

Cable roof, compliant supporting contour, cable trusses

The following structural possibilities which enable to decrease the compliance of saddle shape cable roof supported by the tension cables are considered in the paper:

- 1) Increasing of the cable net rigidity
- 2) Increasing of the cable net prestressing level
- 3) Using of cable trusses as the supporting contour structure

Estimation of the structural possibilities efficiency was conducted by the comparison of the cable net steel expenditure and the maximum vertical displacements for the variant of composite structure of the saddle shape cable roof at the action of calculated vertical load combination. The calculated vertical load combination is dead weight of the structure and snow. The composite structure of the saddle shape cable roof is formed by the steel cable net and roofing made of composites, including reinforced foamplastic and saddle shape plywood sheets.

The dependences of the maximum vertical displacements and cable net steel expenditure for the variant of composite structure of the saddle shape cable roof supported by the tension cables from the cables of the net prestressing level and modulus elasticity were obtained by the results of numeral experiment. The numeral experiment was connected with the determination of maximum vertical displacements and cable net material expenditure for the square in plan saddle shape cable roof supported by tension cables.

The possibility to decrease the compliance of the composite structure of the saddle shaped cable roof by using of the cable trusses as the supporting contour structure was tested. Several variants of the cable trusses shown in Fig. 1 were considered.

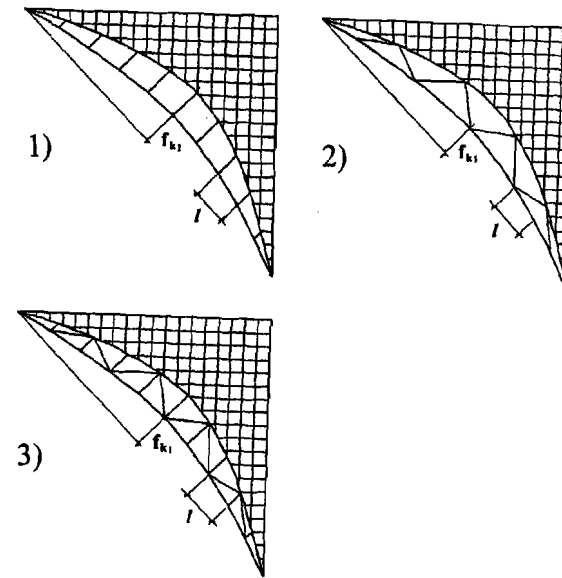


Fig 1. Variants of cable trusses

$f_{k1}$  – initial deflection of upper girdle;  $l$  – length in plan of panel

It was shown that the most effective variant to decrease the compliance of the saddle shape cable roof, supported by tension cables, is the utilization of cable trusses for the structure of supporting contour.

It was stated that utilization of cable trusses for the structure of supporting contour enables to decrease maximum vertical displacements for the considered structure at 3,27 - 3,58 times, when the support points are completely fixed at the probable displacements, and at 1,46 - 1,82 times in the case when the support points have displacements which are limited by the probable displacements of anchors. At the same time expenditure of the cable nets increases at 3,82 - 4,42 times, when the support points are completely fixed and at 1,38 - 1,7 times, when the support points have displacements.