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CALCULATION OF NODAL DISPLACEMENTS OF HIERARCHIC CABLE STRUCTURES

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The paper deals with the formation of hierarchic cable roofs and their calculation principles. The roof has a saddle shape and is suspended by a system high-strength carbon-fiber cables. Such a structure has all the benefits characteristic of ordinary saddle-shape cable roofs but a better correlation between the covered volume and area. The behavior of the structure is geometrically nonlinear. To reduce the complexity and amount of calculations and to avoid the convergence problem in matrix calculations, the method of substructuring is applied. By using the existing software, we calculated strains and displacements in the complicated hierarchically subordinated structures and determined the effect of displacements of a separate structural element on those of all the other elements. It is shown that, by the formation of higher-level cable structures, the use of sloping pendants can be avoided. The hierarchic cable structures are suitable for covering great spans and areas with an insignificant snow load. They can also be used for completely or partially dismountable temporary coverings.