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Author: Prof. Anatoliy Alpatov

Institute of Technical Mechanics of the National Academy of Science and State Space Agency of Ukraine,
Ukraine, aalpatov@ukr.net

Dr. Vjacheslav Gusynin

State Space Agency of Ukraine (SSAU), Ukraine, s23@nkau.gov.ua

Dr. Pavel Belonozhko

Institute of Technical Mechanics of the National Academy of Science and National Space Agency of
Ukraine, Ukraine, byelonozhko@mail.ru

Dr. Sergey Khoroshilov

Institute of Technical Mechanics of the National Academy of Science and National Space Agency of
Ukraine, Ukraine, skh@uk.net

Dr. Alexandr Fokov

Institute of Technical Mechanics of the National Academy of Science and National Space Agency of
Ukraine, Ukraine, fokov@osa.dp.ua

SHAPE CONTROL OF LARGE REFLECTING STRUCTURES IN SPACE

Abstract

Large reflecting structures are functionally necessary element of perspective space systems [1]. Development of satellite communication, radio astronomy, solar energy, investigation of the Moon, planets of Solar system and deep space determines the necessity for characteristic improvement of large-sized space reflectors.

The variant when reflecting surface is fastened on a cellular frame, which shape is provided by the cable tension system, is a perspective constructive decision for development of various technical systems. Exacting requirements are imposed to reflecting surface accuracy of such structures. These requirements determine the shape control topicality of the reflector frame.

Research results of the shape control problem for the large reflecting surface of large space structure [2-4] are submitted. Different factors causing shape distortion of the reflecting surface in various operating modes [3-5] are considered. The approach for forming investigation, which is based on decomposition of mechanical system and allocation independent shape-building elements, is offered. Applicability conditions for using quasistatic models are determined on the basis of the feature structure analysis in view of results of imitating modeling dynamics. Discrete and continual models for shape-building are developed. Algorithms for reflecting surface shape control are proposed and variants of their technical realization [4-5] are considered. Efficiency of the models and algorithms is confirmed by the comparative analysis of the results of computer simulations.

References

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