

УДК 62-218.8

РАСЧЕТ НА ПРОЧНОСТЬ И ЖЕСТКОСТЬ С ПОСЛЕДУЮЩЕЙ ОПТИМИЗАЦИЕЙ ПЛАТФОРМЫ ГЛАВНОГО ЗЕРКАЛА ТЕЛЕСКОПА

Захаров В. О., Еникеев Т. М., Скворцов Ю. В., Альмурзин П. П.

Самарский национальный исследовательский университет
имени академика С. П. Королёва, г. Самара

At present, most engineering structures are made of composite materials. The property of these structures is of the greatest interest.

Platform which maintains the main mirror of space telescope is made using carbon-fiber-reinforced polymer. This is a 1.6-meter three-layer platform. There are two mass elements which applied by means of twelve sleeves. Sleeves are made using titanium.

Structural model is analyzed by using Computer-Aided-Engineering program MSC.Patran/Nastran. Properties of solid body are applied to the parts of platform. Then whole 3D-model is meshed on tetra finite-elements. Fixes are applied on the bottom edge of construction. Two mass finite-elements are attached to platform by twelve points which are associated with finite-elements-model. Platform is under inertial load.

After the analysis we have results such as the lowest natural frequency is about 72 Hz, and the highest deformation is about 2 mm. However, frequency must be 81 Hz. Therefore, we have to optimize the construction of platform: thickness of stiffener ribs was increased; points, where the mass elements are connected to platform, were strengthened. After the re-analysis we have received acceptable results: lowest natural frequency is about 82 Hz, and the highest deformation is about 2 mm.

The highest stress that we have received is about 5 mega pascal. This amount of stress is in the fix points and places that carry the weight of mass elements.

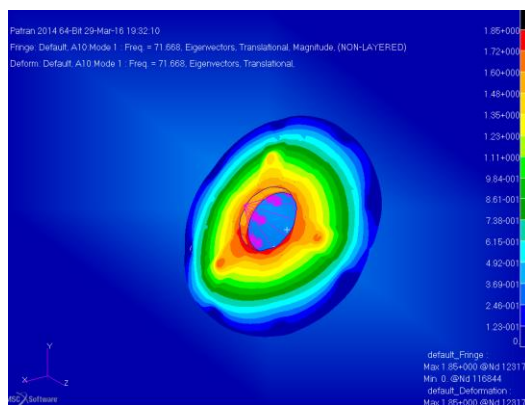


Fig. 1. Results