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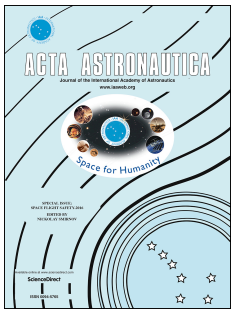


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# The Projecting Surface Method for Improvement of Surface Accuracy of Large Deployable Mesh Reflectors

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**Abstract**

In traditional form-finding of a deployable mesh reflector (DMR), the nodes of the DMR mesh are placed on the desired working surface and the surface accuracy of the DMR is measured either by the deviation of the nodes from the desired working surface or by the deviation of the mesh from its best-fit surface. Placement of nodes on working surface and inaccurate measures of surface accuracy cause non-negligible surface errors that cannot be further reduced. To deal with these issues and to further improve surface accuracy of DMRs, a new mesh geometry design method, called the Projecting Surface Method (PSM), is presented in this paper. The highlight of the PSM is that it purposely places the nodes of a DMR off its working surface, to achieve higher surface accuracy. To this end, a direct RMS error measuring the deviation of a DMR mesh from its desired working surface is introduced and a projecting surface for hosting the nodes of the DMR mesh is defined. By the direct RMS error and projecting surface, an optimization process produces a mesh geometry with its best-fit surface closest to the desired working surface, leading to significant surface error reduction. As shown in numerical examples of DMRs with 37, 271 and 817 nodes, the PSM can reduce surface errors by 50% or more. The proposed method is usable with existing form-finding methods for further improvement of surface accuracy of DMRs.

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