SM3S_10879

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Surface Accuracy of Inflatable Reflector Covered with Stretched Cable

Kazuo Tanizawa[(1)], Jun Nishimura[(2)], Kazuo Yamamoto[(1)]

(1) *Kinki University, Nagagun, Japan*
(2) *ISAS, Sagamihara, Japan*

We present here an idea of the inflatable reflector and the surface error evaluation of this reflector, which is segmented into N-regular polygonal facets by the uniformly stretched cable net to improve the reliability on surface accuracy. As for the surface error evaluation, we treat the problem by using power series expansion of the complex variables, in which we take into account of the self-consistent boundary condition of the membrane on the supporting cable. From this study, we made it clear the effects of design parameters on the surface accuracy, such as the internal pressure, the cable tension, the membrane tension, the facet size, and etc. We also derived simple approximate formulas to give the RMS surface accuracy within 5% error in the realistic design region, where the surface error was almost proportional to the ratio of the cable force to the membrane tension.

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