Reflectors Made From Membranes Stretched Between Beams

The beams could be bent to adjust reflector shapes.

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Lightweight cylindrical reflectors of a proposed type would be made from reflective membranes stretched between pairs of identically curved and identically oriented end rails. In each such reflector, the curvature of the two beams would define the reflector shape required for the intended application. For example, the beams could be curved to define a reflector of parabolic cross section, so that light incident along the axis of symmetry perpendicular to the cylindrical axis would be focused to a line. In addition, by applying suitable forces to the ends of the beams, one could bend the beams to adjust the reflector surface figure to within a precision of the order of the wavelength of the radiation to be reflected.

The figure depicts an example of beams shaped so that in the absence of applied forces, each would be flat on one side and would have a radius of curvature R on the opposite side. Alternatively, the curvature of the reflector-membrane side could be other than circular. In general, the initial curvature would be chosen to optimize the final reflector shape. Then by applying forces F between the beam ends in the positions and orientations shown in the figure, one could bend beams to adjust their shape to a closer approximation of the desired precise circular or noncircular curvature.

This work was done by Jennifer Dooley and Mark Dragovan of Caltech and Jason Tolomeo of Lockheed-Martin for NASA's Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

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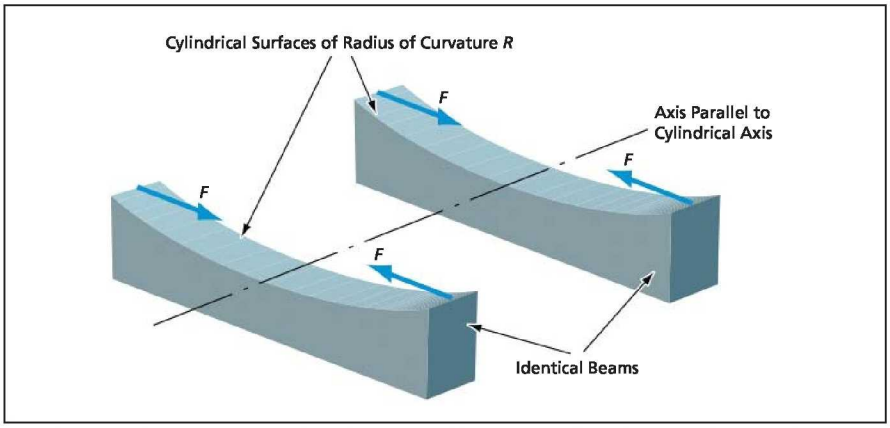

Two Identically Shaped and Oriented Beams would be bent to adjust their curvatures precisely. A reflective membrane would be stretched between the precisely curved surfaces.