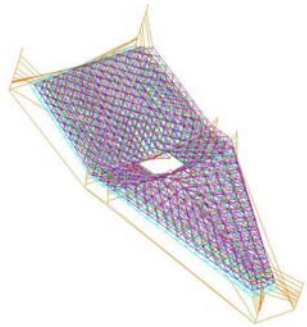
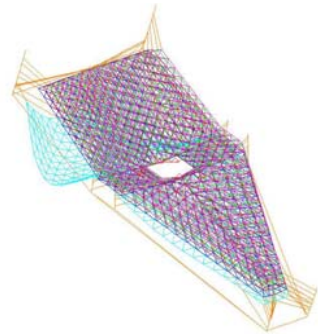


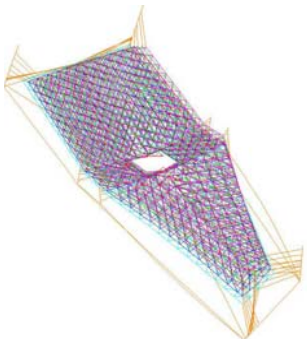
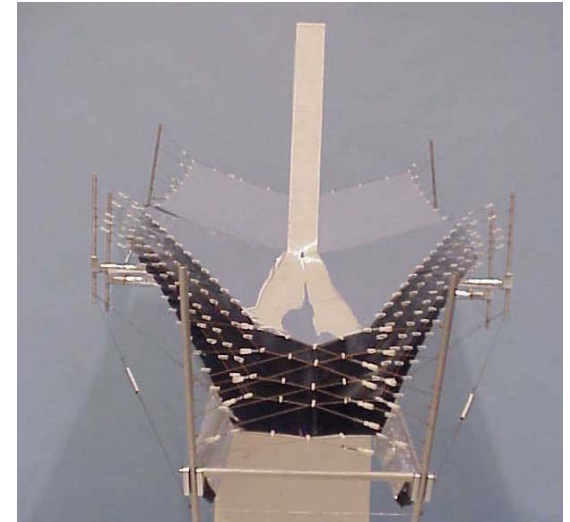
Aerospace Case Study (L'Garde, Inc. – James Webb Space Telescope)



A finite element analysis using NEi Nastran was carried out on the Northrop-Grumman James Webb Space Telescope (JWST) Sunshield. The sunshield consists of five layers of material to shield the telescope optics from the sun to keep its temperature from going above a certain level. The above left figure shows the finite element model of the five-layer sunshield.

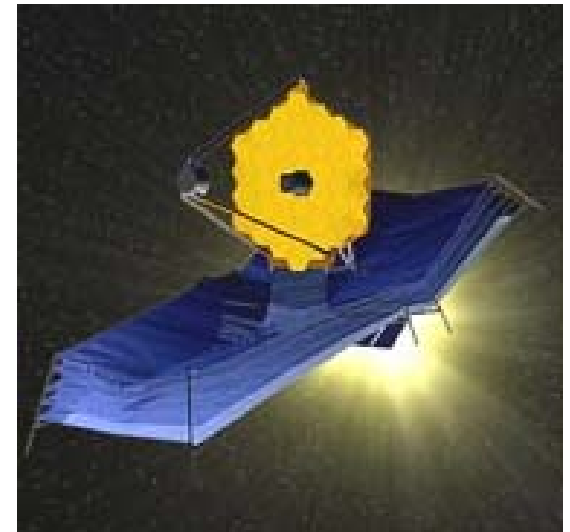


The above right figure shows the 1/10th scale sunshield fabricated by L'Garde, Inc. (www.lgarde.com). Northrop-Grumman (then TRW) provided the 1/10th scale support hardware. Note the absence of membrane wrinkling at the design stress level.



A modal analysis was carried out using NEi Nastran. The middle left figure below shows the first membrane mode of frequency 0.404 Hz and a string tension of 5 lbs. The first support structure mode of 1.103 Hz and string tension of 5 lbs. is shown in the below left figure.

As a result of the study using NEi Nastran it was found that it is important to adjust the tension in the reaction cables properly. Moreover, it was recommended that the edges of the membrane be shaped accordingly using “catenaries” and attached to a perimeter cable to distribute the loads more evenly over the membrane.



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