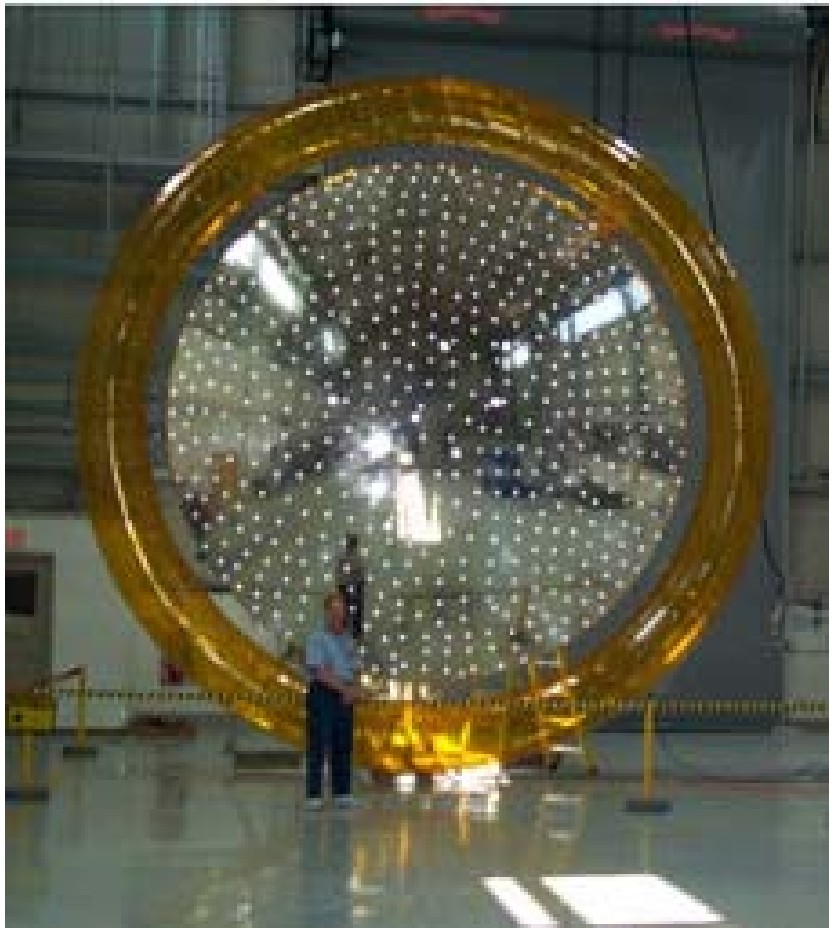


Figure 1. Inflatable antenna

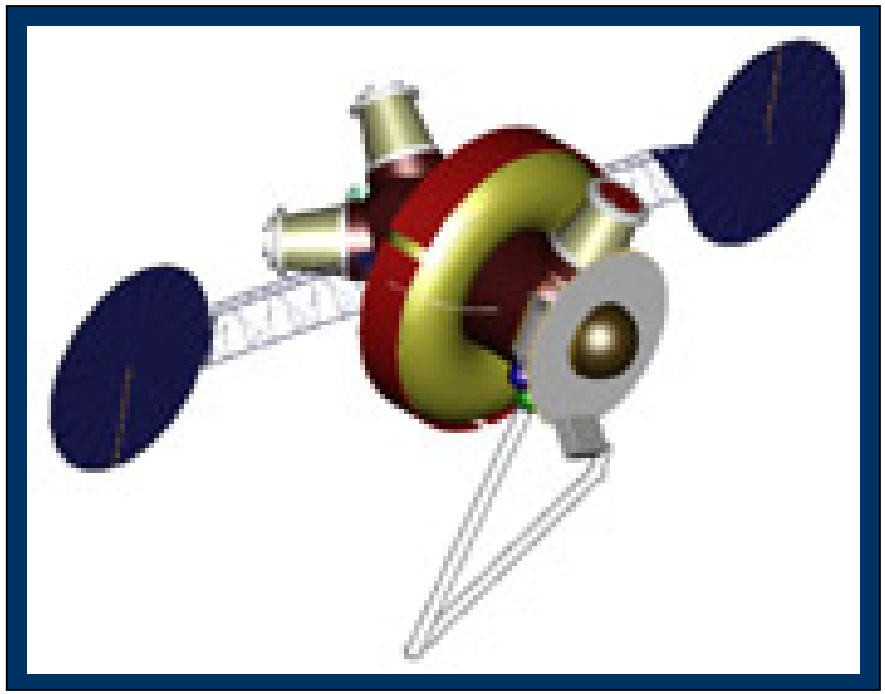
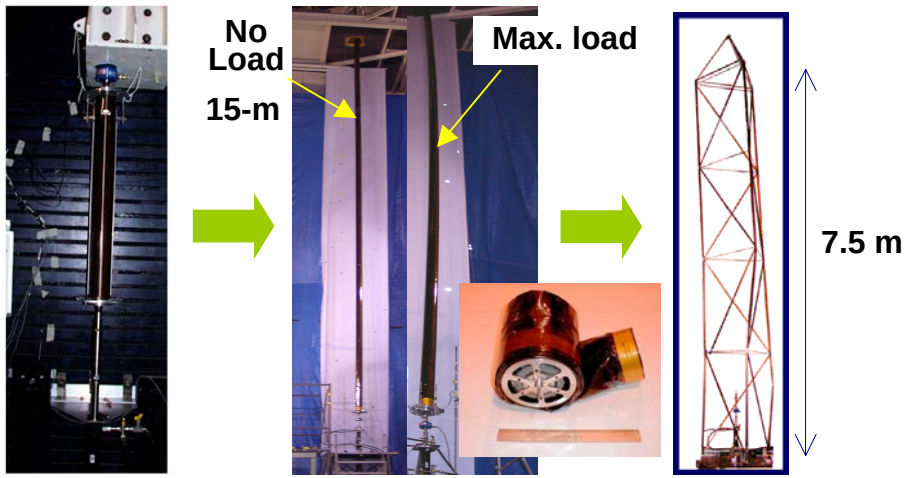


Figure 2. Inflatable habitat

Space durable polymer films with improved properties for applications on future spacecraft

Inflatable/Rigidizable Tubes



Characterization by testing and analysis

Long Column verification

Application to built-up structures

Figure 3. Thin Film and Rigidizable Materials Technology

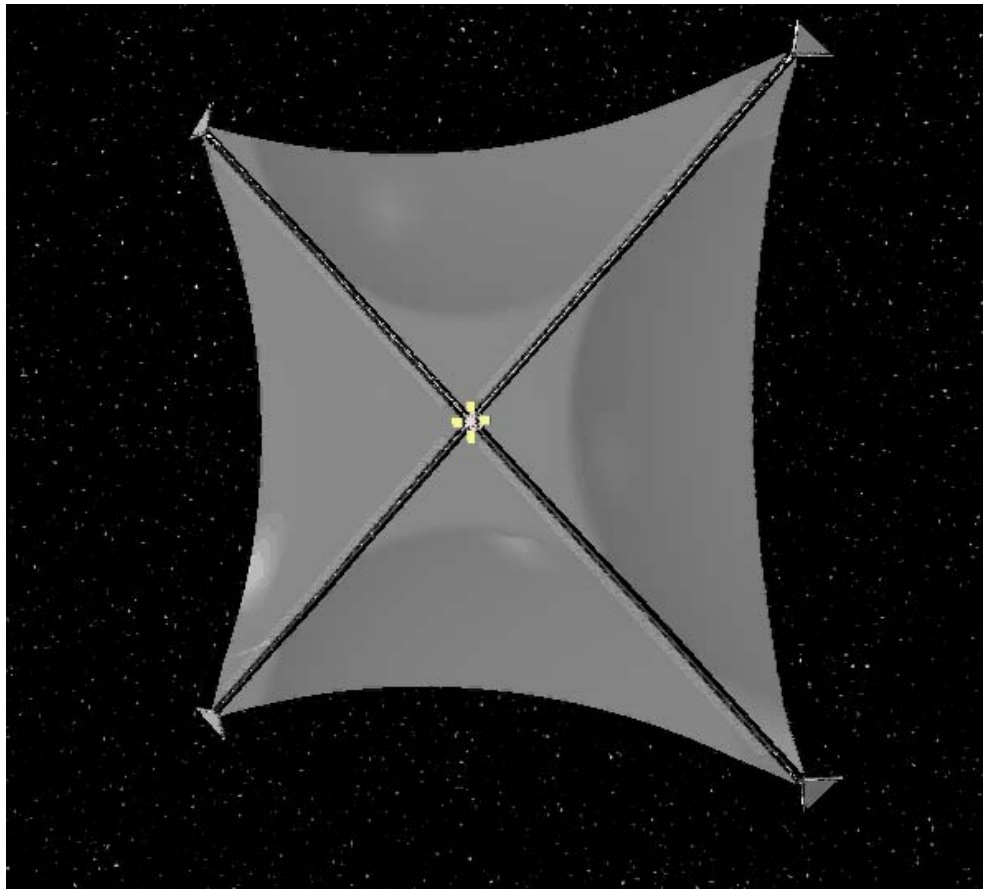
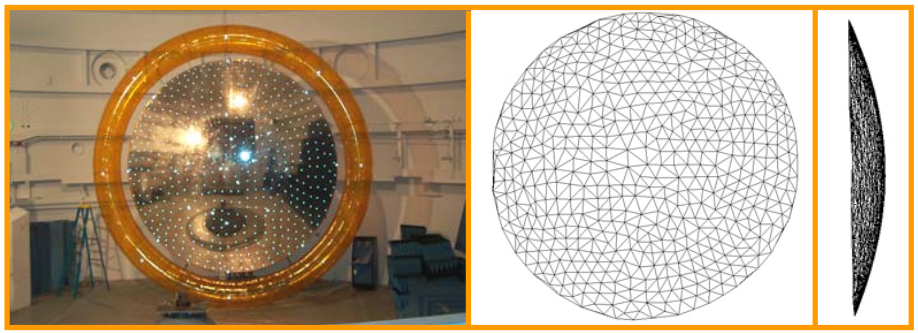


Figure 4. Solar sail designed of thin-film membrane with four supporting booms.

Inflatable antenna



Photogrammetry and Laser Vibrometry

3-D Shape Measurement

Figure 5. Experimental methods for large inflatable membranes

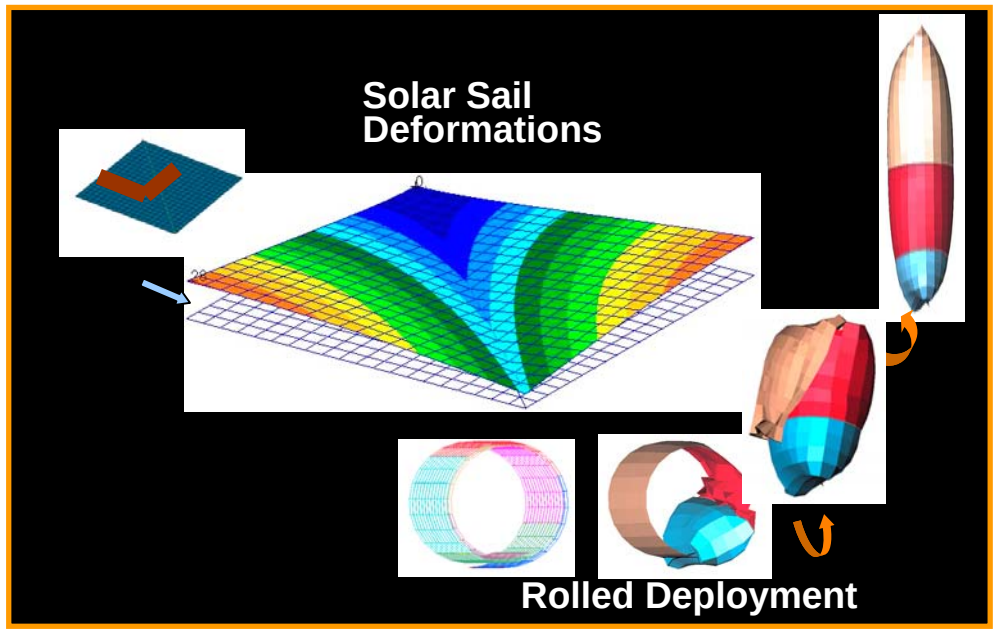


Figure 6. Computational mechanics methods for simulating solar sail deformations and rolled deployment of inflatable columns (LS-DYNA and ABAQUS Implicit and Explicit)

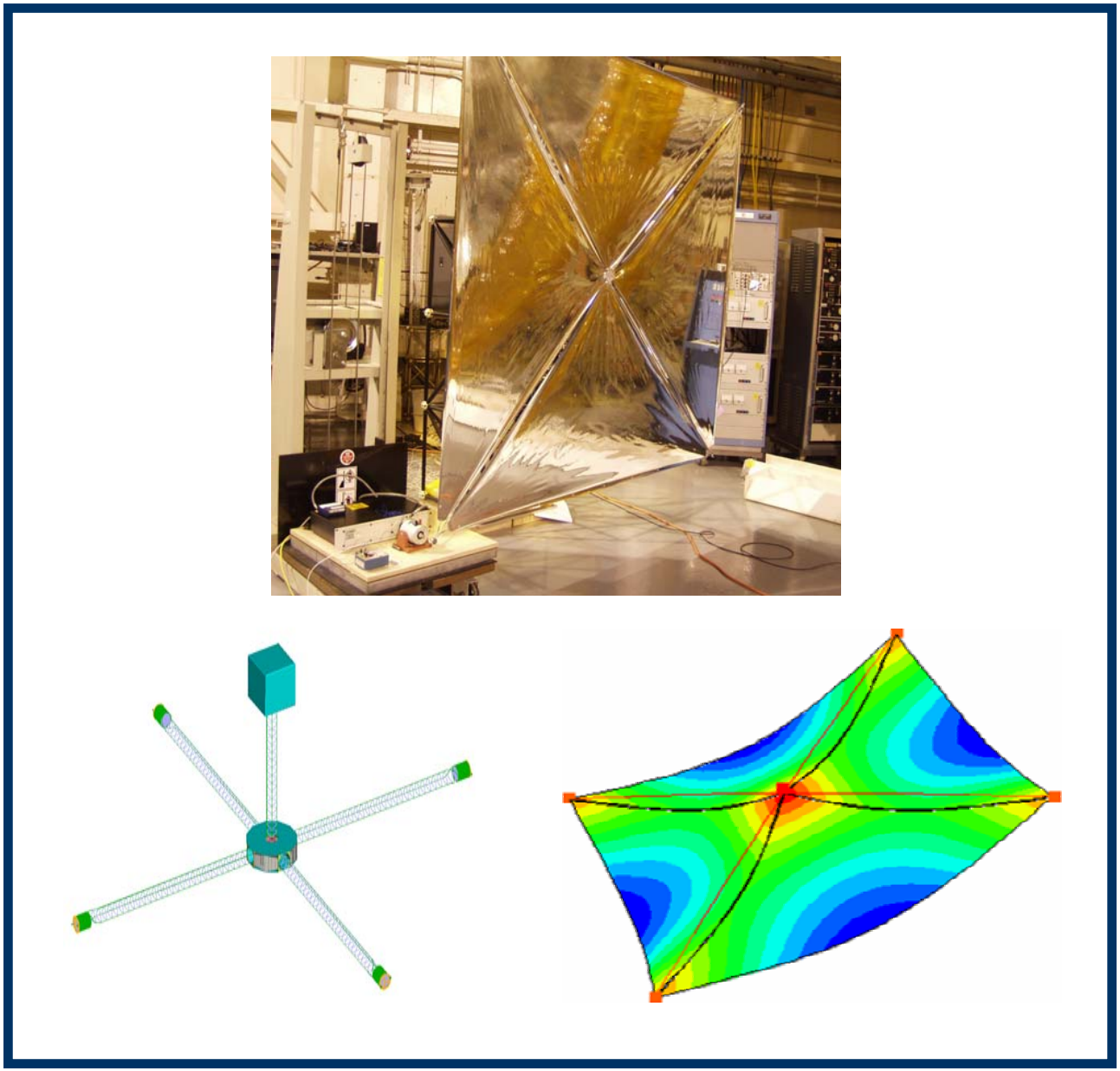
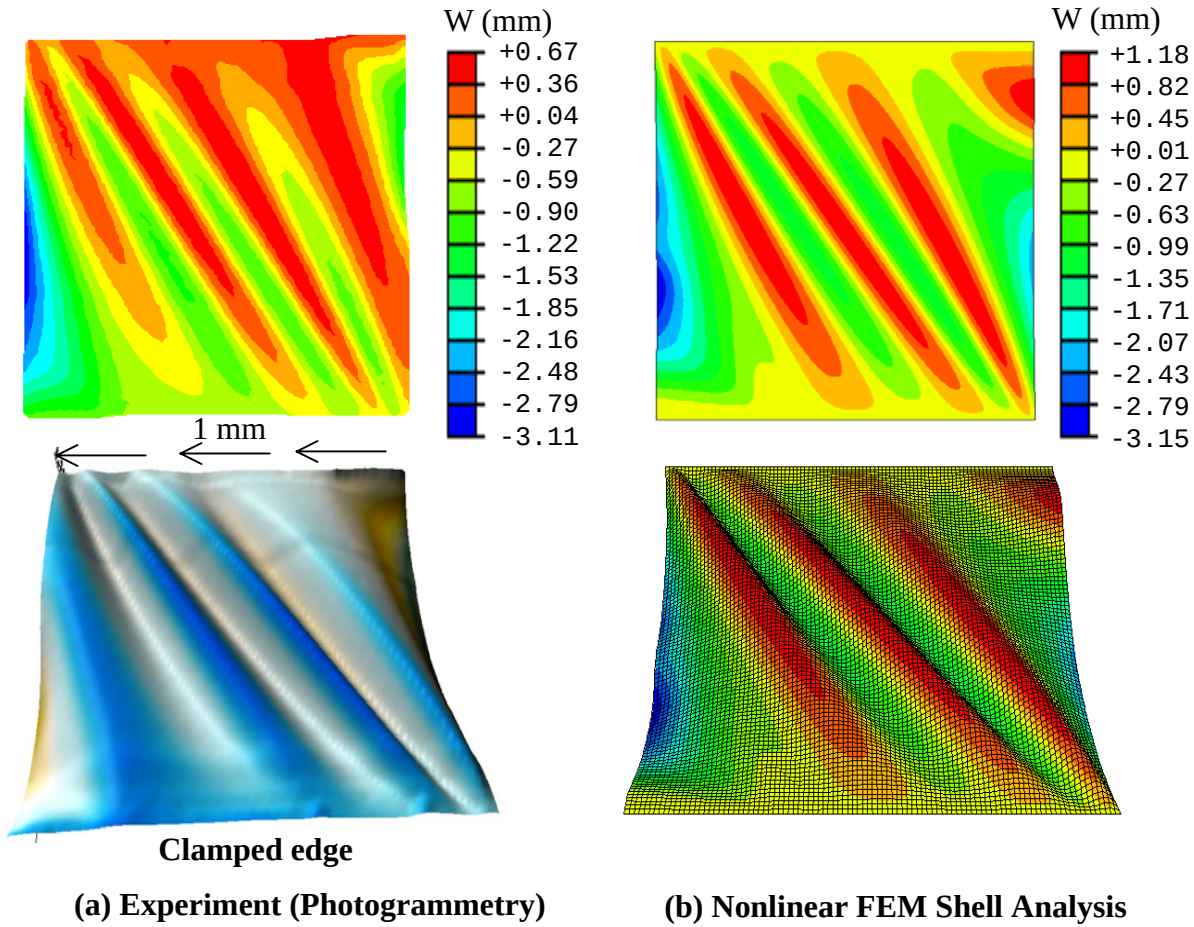
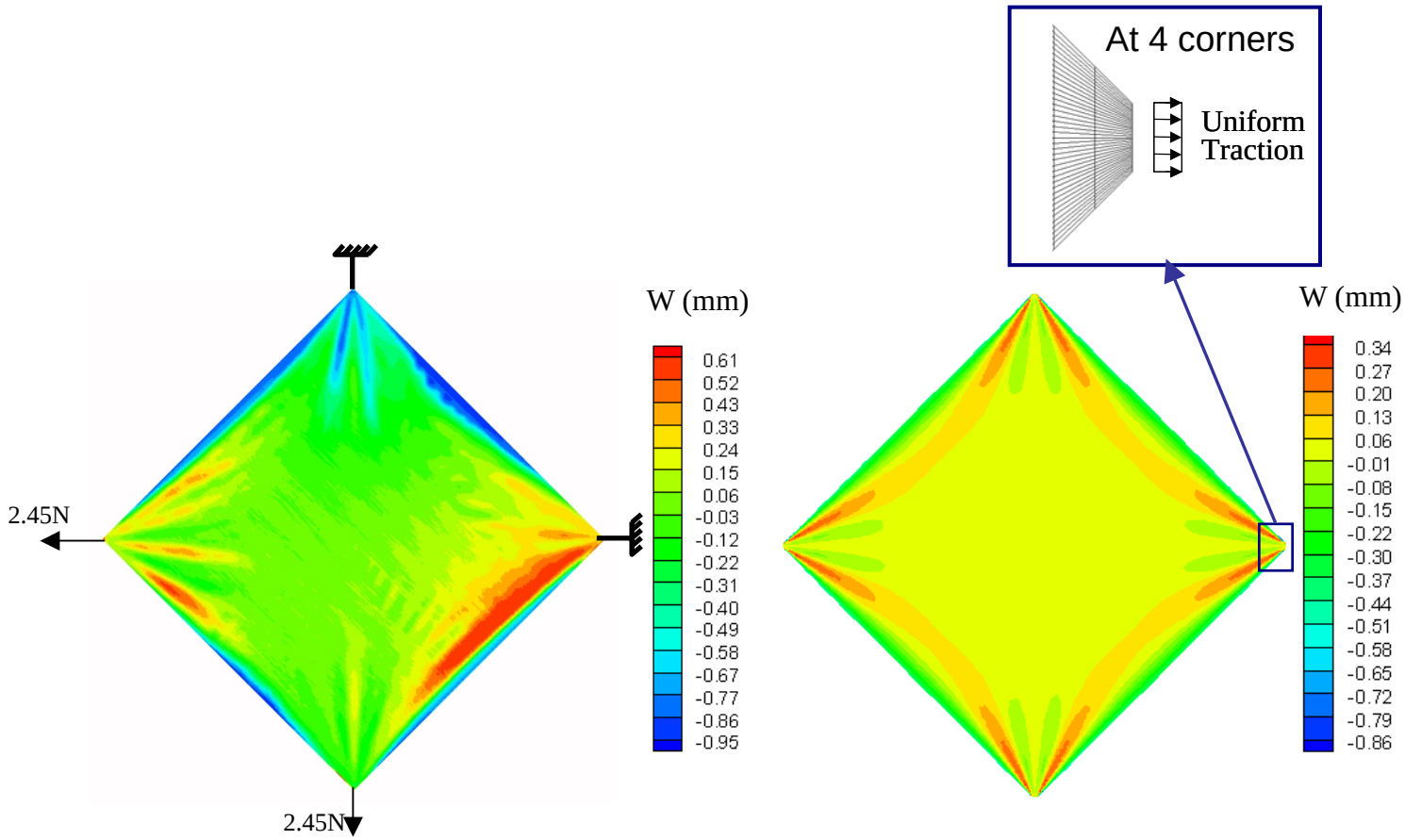


Figure 7. Testing and analysis of sub-scale solar sail



(a) Experiment (Photogrammetry) **(b) Nonlinear FEM Shell Analysis**

Figure 8. Wrinkling deformations of square (229mm x 229mm), 0.0762 mm-thin Mylar film subjected to prescribed displacement along top edge and clamped along bottom edge: (a) Experiment (Photogrammetry) [11], and (b) Nonlinear FEM shell analysis using S4R5 elements in ABAQUS [6]).



(a) Experiment (Capacitance sensor measurement) **(b) Nonlinear FEM Shell Analysis**

Figure 9. Wrinkling deformations of square (500mm x 500mm) 0.0254mm-thin KAPTON film loaded in tension by corner tractions (a) Experiment (Capacitance sensor measurement) [12], and (b) Nonlinear FEM shell analysis using S4R5 elements in ABAQUS [6]).