5.0> Drape Analysis II ("gausscurv" & "deepdrawn")

(A) "gausscurv"

This example illustrates the difference in draping behaviour on surfaces of different Gaussian curvature.

- Create new database gausscurv.db
  - Import neutral file gausscurv.ntl. This contains three surfaces having the same principal curvature in one direction, but different curvatures in the orthogonal direction. The projections of the surfaces onto the xy plane are all circular
  - Play session file materials.ses to create materials
  - Set angles to "0 0 0" to obtain default view
  - Open Laminate modeler using a new Layup file
    - Create a scissor draped material with default values
    - Create a scissor draped ply SC_Ply_1 on the negative gaussian-curvature surface section, starting from [0 0 10], with the initial vector along the X-axis and a step length of implicit, 0.5
    - Create a scissor draped ply SC_Ply_2 on the zero gaussian-curvature surface section, starting from [0 25 10], with the initial vector along the X-axis and a step length of implicit, 0.5
    - Create a scissor draped ply SC_Ply_3 on the positive gaussian-curvature surface section, starting from [0 50 10], with the initial vector along the X-axis and a step length of implicit, 0.5
    - Import the flat patterns in IGES format into MSC/ PATRAN and compare with the projected outline of the surfaces
    - Drape the surfaces manually to confirm that the zero gaussian-curvature (cylindrical) surface produces zero shear and the starting point is immaterial

If your have difficulty with this exercise, examine or play the session file gausscurv.ses after opening a new database.

(B) "deepdrawn"

This example shows the effect of draping over a surface having severe Gaussian curvature and large area, leading to severe shear distortion. It also highlights the different draping solutions generated by the various global draping options.

- Open new database deepdrawn.db.
  - Import neutral file deepdrawn.ntl.
  - Play session file materials.ses to create materials
  - Set angles to "0 0 0" to obtain default view
  - Open Laminate Modeler using a new Layup file
    - Create a scissor draped material with default values
    - Create a scissor draped ply starting from Node 138 (central node), initial Vector in the X-direction, steplength Implicit, 0.5 and covering all elements.
      - Note that draping stops at the material shear limit of 60°
    - Change the maximum strain to 90° (Additional Controls, Material) and create a new scissor draped ply.
      - The draping continues, but would be unrealistic.
    - Change the reference angle to 45°, restore maximum strain to the material value and create a new scissor draped ply.
      - Here, shear is so severe that fabric overlaps itself
    - Create a split definition (Additional Controls, Boundaries) from the edge of the surface along the plane of symmetry perpendicular to the X-direction, and create a new scissor draped ply
      - split creates a dart in the fabric
    - Remove split definition, select planar global draping (Additional Controls, Geometry) and redrape

- different pattern
- shearing non-zero along principal direction, but builds up rapidly
- Select energy global draping and redrape.

If your have difficulty with this exercise, examine or play the session file deepdrawn.ses after opening a new database.