



Optimized thick-apex unstiffened equivalent ellipsoidal shell with inward $\cos(\theta)$ imposed w from $\theta=0$ to 90 deg.
 PA= 0.0; PB= 2.0; 480 finite elements are used; crude model
 step 70 displacement w contours at maximum PB
 nonlinear w ; $\cos(\theta)$ imposed normal disp. w at junction between Shell Segments 3 and 4 (see Fig.2)
 subroutine usrfab.soccerball.plastic.src is used with NGCP = 1

Θ x -0.00
 Θ y 0.00
 Θ z -0.00
 x
 9.900E+00

Fig. 196 Elastic-plastic analysis of the **optimized unstiffened equivalent ellipsoidal shell with the thick apex with $t(\text{apex}) = 0.4$ inch; $W_{\text{imp}}=0.2$ inch; the optimum design is listed in Table 78.** State of the shell at load set B (PB) step no. 70 at the end of Run 5. (See Fig. 193). Load set B consists of a number of concentrated normal inward-directed imposed **displacements** applied along the junction of Shell segments 3 and 4 (Figs. 2, 169, 181, 190, 191) distributed as $\cos(\theta)$ from $\theta = 0$ to 90 degrees in the circumferential coordinate along Row no. 5 in Shell Units 11 and 12. (See Table a40). This imposed normal displacement distribution is used because it generates a dent that **locally** resembles the deformation in Figs. 190 and 191, that is, the linear buckling modal imperfection with $n = 1$ circumferential wave. Compare with Fig. 185, for which a $\cos(\theta)$ distribution of concentrated normal inward-directed loads generates the dent rather than normal inward-directed imposed displacements.