



Fig. 189 Elastic-plastic analysis of the **optimized unstiffened equivalent ellipsoidal shell with thick apex, $t(\text{apex})=0.4$ inch; $W_{\text{imp}}=0.2$ inch; the optimum design is listed in Table 78.** Shown here is the state of the imperfect shell under uniform external pressure (Load Set A) in its **post-collapse** phase (trace 3 in the previous figure). The shell has a residual dent generated by a “ $\cos(\theta)$ ” distribution of normal inward-directed concentrated **loads** along a circumference from $\theta = 0$ to 90 degrees. This post-collapse nonlinear equilibrium state corresponds to the last step in Run no. 11 (soccerball.out2.11) in Table 87. Compare the deformation shown here with that depicted in Fig. 192, for which the imperfection is the $n=1$ linear buckling mode shape displayed in Figs. 190 and 191.