



Fig. 184 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. 45 at the end of Run 6. (See Fig. 180). This is the **residual dent** in the shell that remains after load set B has been removed, that is, when both PA and PB are zero. (The shell is unloaded). The depth of the dent, 0.2043 inch, is close to the correct amplitude,  $W_{\text{imp}} = 0.2$  inch, of the axisymmetric linear buckling modal imperfection in the presence of which the shell was optimized. Compare with Fig. 171 for which the residual dent is produced by a single concentrated load: uniform normal inward-directed pressure applied to a single finite element. The shape of the “ $\cos(\theta)$ ” residual dent shown here is more harmful than that shown in Fig. 171, as is demonstrated in Fig. 188, because the “ $\cos(\theta)$ ” residual dent **locally** more closely resembles the negative of the linear buckling mode with  $n = 1$  circumferential wave displayed in Fig. 179.