



Optimized thick-apex unstiffened equivalent ellipsoidal shell with residual dent as an initial imperfection
 PA= 0.0; PB= 0.0; 480 finite elements are used; refined model
 step 59 residual plastic strains, epx, layer 2, outer fiber
 outer fiber residual plastic strain from inward normal concentrated pressure on element 1 of Unit 4
 subroutine usrfab.soccerball.plastic.src is used with NGCP = 1

Θx -0.00
 Θy 0.00
 Θz -0.00

9.900E+00 x

Fig. 172 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 residual meridional **outer fiber** plastic strain, epx, in the unloaded shell with the residual dent. Here the residual dent is produced by the application and removal of pressure on a **single finite element** (like a single normal, inward-directed concentrated load). Compare with Fig. 187, for which the residual dent is produced by the application and removal of a $\cos(\theta)$ distribution of normal, inward-directed concentrated loads along a circumferential line from $\theta = 0$ to 90 degrees.