- STAGS "refined" soccerball; elastic-plastic; dent from point load; Wimp=0.297 inch; 480; usrfab, node 3976
- STAGS "crude" soccerball; elastic-plastic; cos(theta) dent; Wimp=0.2043 inch; 480; usrfab, node 911
- A STAGS "crude" soccerball; elastic-plastic; cos(theta) dent; Wimp=0.2343 inch; 480; usrfab, node 911
- STAGS "crude" soccerball; elastic-plastic; n=1 mode imperf; Wimp=0.200 inch; 480; usrfab, node 911

× design pressure (psi)

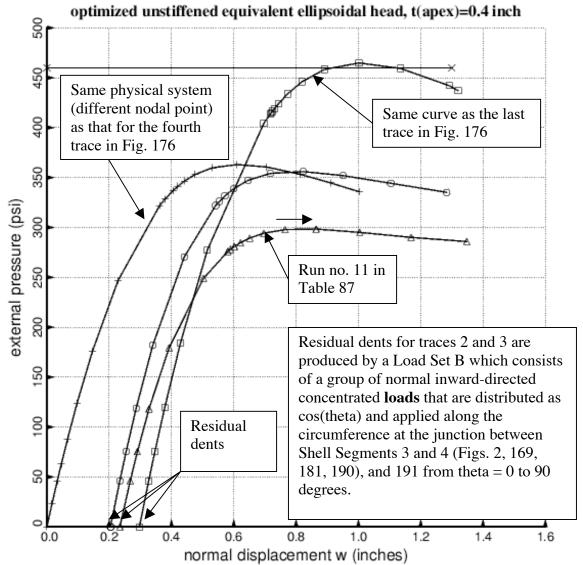


Fig. 188 Elastic-plastic analysis of the **optimized unstiffened equivalent ellipsoidal** shell with the thick apex with t(apex) = 0.4 inch; Wimp=0.2 inch; the optimum design is listed in Table 78. Collapse of the imperfect shell with three different kinds of imperfections. trace 1= imperfection is a residual dent caused by a single concentrated load (Fig. 171); traces 2 and 3 = imperfections are residual dents caused by a "cos(theta)" distribution of concentrated loads along a circumferential line from theta = 0 to 90 degrees (Figs. 184 and 186), and trace 4 = a linear buckling modal imperfection with n=1 circumferential wave (Fig. 190). Notice the similarity between traces 2 and 4. These two curves differ mostly by a horizontal shift of w= 0.2 inch, which represents the depth of the residual dent created by the "cos(theta)" distribution of concentrated loads. The "cos(theta)" residual dent is just as harmful as the n=1 buckling modal imperfection.