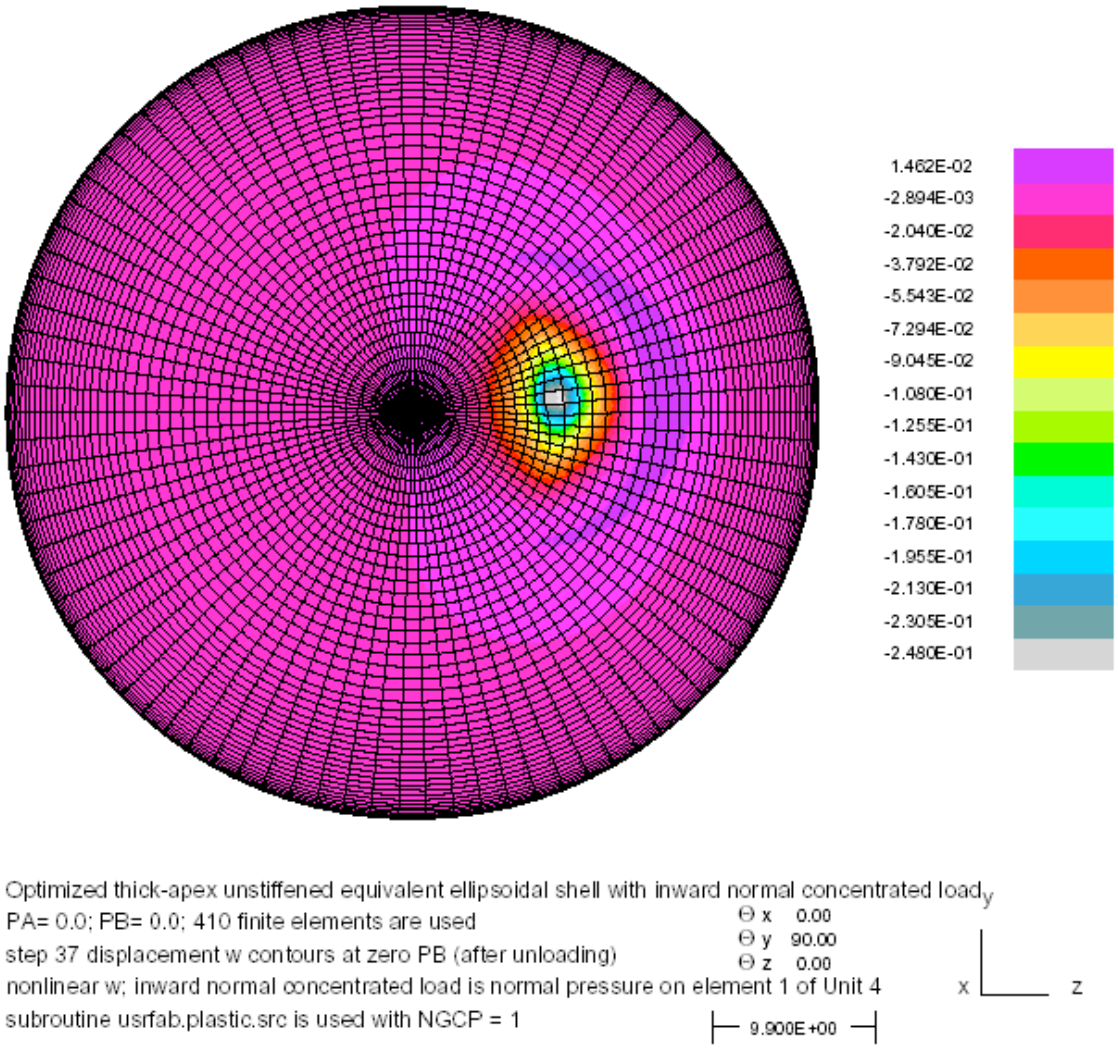

Fig. 167 Elastic-plastic analysis of the **optimized unstiffened equivalent ellipsoidal shell with thick apex, t(apex)=0.4 inch; Wimp=0.2 inch; the optimum design is listed in Table 78.** This figure shows the end of the **second phase**, the unloading phase, of a STAGS run the objective of which is to produce a **residual dent** with depth fairly close to 0.2 inch, which is the amplitude of the axisymmetric buckling modal imperfection, Wimp=0.2 inch, that was used during optimization of the shell. In this case the residual dent is produced in Load Set B (load factor, PB) by application of normal inward-directed pressure over a **single finite element** in the STAGS model. Displayed here is the **residual dent** remaining after the concentrated load, PB, has been removed and before the dented shell has been loaded by the uniform external pressure, PA. The user-written SUBROUTINE USRFAB is employed, not the user-written SUBROUTINE WALL. Here the depth of the residual dent, 0.248 inch, is greater than the depth of the linear axisymmetric buckling modal imperfection, Wimp = 0.2 inch, in the presence of which the optimum design of this shell was obtained.