



Fig. 85 Nonlinear bifurcation buckling mode of the optimized **–mode 1** axisymmetrically **imperfect unstiffened** equivalent ellipsoidal shell loaded by the external design pressure,  $p = 460$  psi. This mode is used as a “trigger” non-axisymmetric imperfection shape (very small amplitude:  $W_{imp} = 0.001$  inch) to obtain nonlinear non-axisymmetric collapse of the shell. The nonlinear non-axisymmetric elastic load-deflection curve is shown as the third trace (triangles) in the previous figure. For the **–mode 1** axisymmetrically imperfect optimized **unstiffened** shell nonlinear **non-axisymmetric** collapse is the critical mode of failure. (See the previous figure). In contrast, for the imperfect optimized isogrid-stiffened shell all the nonlinear non-axisymmetric bifurcation buckling pressures are higher than the axisymmetric collapse pressures displayed in Fig. 16.