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Buckling, collapse, and first ply failure pressures have been obtained for a range of spheroidal FRP shells under static external pressures. Comparisons of the load carrying capacities are made for like geometries. It is shown that some prolate ellipsoids can be stronger, for up to 70% than the equivalent spheres. The effect of boundary conditions in the equatorial plane on the buckling strength is assessed for the diameter-to-wall- thickness ratio ranging from 100 to 500. Regions where the strength (FPF) rather than asymmetric bifurcation control the failure have been identified. Small perturbations in ply orientations, ±5°, have been introduced in order to assess their influence on the buckling strength. Both symmetric and asymmetric stacking with respect to the mid-plane have been analyzed (including random stacking).

Initial shape imperfection positioned at the apex of a hemispherical head has been examined. The latter aimed at assessing the sensitivity of buckling pressure to deviations from perfect geometry. Results have been obtained for the lower bound approach based on the local flattening using the increased-radius. Imperfections in ellipsoids have also been studied. Axisymmetric modeling of all shells was used throughout in this study. Only the upper half of shells was modeled, and the issue of boundary conditions at the equatorial plane was also explored.

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