# SPHERICAL LATTICE GEOMETRY VS. POSTBUCKLING STABILITY

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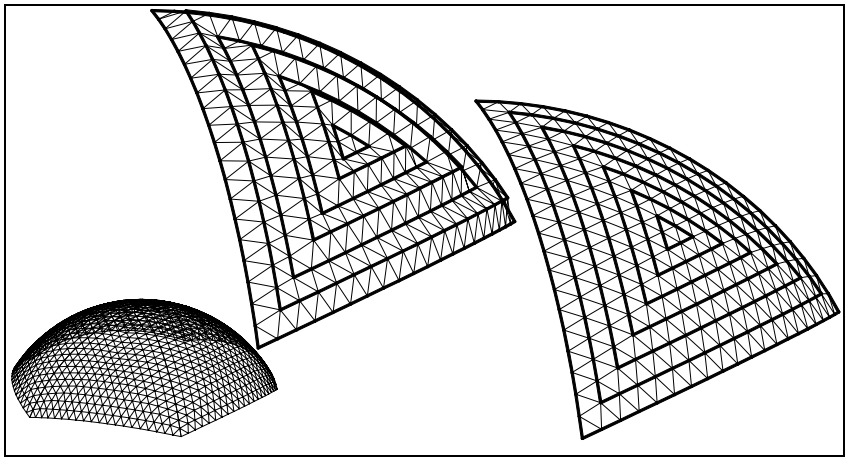
The global postbuckling stability of latticed dome structures is dependent on the overall geometry and the structural properties of the individual members. In this study, the global stability of a spherical dome structure is compared with a spherical dome structure with a slightly different geometry but with similar members. This difference in geometry is largely achieved because of the characteristics of the triangulation scheme used to subdivide a spherical triangle into smaller spherical triangles using an optimal (i.e. smallest) number of different arc lengths. This triangulation scheme is based on concentric "triangular rings" denoted by the bold lines in the figure below. As shown in this figure, the rings are on the same spherical surface in one dome segment, but in the second structure, every other concentric ring is displaced a small amount from the surface of the sphere. Displacing the concentric rings in this triangulation scheme maintains the same optimal subdivision which is not the case for other optimal subdivision schemes.

The dome structures being compared are based on the icosahedral subdivision of a sphere using the upper 5 segments of a spherical icosahedron to form a single layer dome structure. The members in each structure are assumed to be pin-connected.

The global postbuckling stability of the structures is evaluated using a method developed by the author and described in References [1] and [2]. Post-buckling stability is compared for both equilibrium and collapse conditions. It was shown in Reference [3] that the post-buckling modes can be vastly different under equilibrium and collapse conditions.



**References**

[1] S.J. Britvec, Stability *and Optimization of Flexible Space Structures*, Birkhauser Verlag, Boston. (1995).
[2] M.D. Davister, M.D., "The Post-Buckling Equilibrium and the Dynamic Collapse of Complex Hyperstatic Pin-Jointed Lattices and Reticulated Shells," Ph.D. Thesis, Dept. of Civil Engineering, University of Colorado at Boulder. 1983.
[3] M.D. Davister, "The Most Degrading Postbuckling Mode of Pin-Jointed Structures," Technical Note, ASCE, Journal of Engineering Mechanics, (to be published).

**Keywords:** Postbuckling, stability, pin-jointed lattices