

Deformations Without Bendings: Explicit Examples

Vladimir Pulov

Department of Physics, Technical University of Varna, Bulgaria
E-mail: vpulov@hotmail.com

ABSTRACT

We consider an interesting class of free of bending deformations of thin axial symmetric shells subjected to constant pressure perpendicular to their surfaces. The meridional k_μ and the parallel k_π principal curvatures of the middle surfaces of such non-bending shells obey a quadratic relation $k_\mu = 2ak_\pi^2 + 3k_\pi$, $a = \text{const}$. These non-bending shells depend on two arbitrary parameters, which are the principal radii r_μ and r_π of some fixed parallel of the shell. Besides, these surfaces have not closed form description in elementary functions. Here we give a parameterization of the whole class of non-bending surfaces by making use of the canonical forms of the elliptic integrals. An alternative parameterization in Weierstrassian \wp and zeta functions is also presented. The obtained explicit formulas are then applied for the derivation of the basic geometrical characteristics of the surfaces.