

## عنوان مقاله:

Two-dimensional Axisymmetric Electromechanical Response of Piezoelectric, Functionally Graded and Layered Composite Cylinders

## محل انتشار:

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## خلاصه مقاله:

A mixed semi-analytical cum numerical approach is presented in this paper which accounts for the coupled mechanical and electrical response of piezoelectric, functionally graded (FG) and layered composite hollow circular cylinders of finite length. Under axisymmetric mechanical and electrical loadings, the three-dimensional problem (3D) gets reduced to a two-dimensional (2D) plane strain problem of elasticity. The 2D problem is further simplified and reduced to a one-dimensional (1D) by assuming an analytical solution in longitudinal direction ( $z$ ) in terms of Fourier series expansion which satisfies the simply (diaphragm) supported boundary conditions exactly at the two ends  $z = 0, l$ . Fundamental (basic) dependent variables are chosen in the radial direction (thickness coordinate) of the cylinder. The resulting mathematical model is cast in the form of first order simultaneous ordinary differential equations which are integrated through an effective numerical integration technique by first transforming the BVP into a set of initial value problems (IVPs). The cylinder is subjected to internal/external pressurized mechanical and an electrical loading. Finally, numerical results are obtained which govern the active and sensory response of piezoelectric and FG cylinders. Numerical results are compared for their accuracy with available results. New results of finite length cylinders are generated and presented for future reference.

## کلمات کلیدی:

Finite length cylinder, FGM, Laminated composites, Piezoelectricity, Boundary Value Problem, Elasticity theory

## لینک ثابت مقاله در پایگاه سیویلیکا:

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