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Electro-elastic analysis of fiber-reinforced multilayered cylindrical composites with integrated piezoelectric actuators. (English) Zbl 1301.74020

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The author presents an analytical solution for a hybrid, hollow cylindrical composite composed of three parts: an internal piezoelectric actuator, a fiber-reinforced laminated multilayer, and an external piezoelectric actuator subjected to mechanical and electrical loadings, within the linear theory of piezoelectricity. The basic equations are formulated in cylindrical coordinates. The general solutions for the outer and for the inner piezoelectric layers are presented, as well as the general solutions in the fiber-reinforced laminated multilayer by means of the state-space method. The mechanical and the electrical boundary conditions are discussed. Numerical results are presented and discussed for piezoelectric and fiber-reinforced materials. A comparison is carried out between the results of the present method and those obtained otherwise. The effect of the fiber angle on the physical fields is investigated.

Reviewer: [Ahmed Ghaleb \(Giza\)](#)

MSC:

- [74F15](#) Electromagnetic effects in solid mechanics
- [74E30](#) Composite and mixture properties
- [74M05](#) Control, switches and devices (“smart materials”) in solid mechanics
- [74G05](#) Explicit solutions of equilibrium problems in solid mechanics

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