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## Three dimensional solutions for smart composite/sandwich plates subjected to Levy-type support conditions using extended Kantorovich method

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Piezoelectric materials are the most preferred material in a wide range of engineering applications in sensing and control such as energy harvesting, structural health monitoring, sound navigation and ranging (SONAR), vibration and noise control. Composite and sandwich laminates with piezoelectric actuators and sensors evoked a tremendous research interest in the field of designing and development of lightweight multi-functional structures known as smart or intelligent structures. The behaviour of smart structures is very complex and pose a difficult challenge for analysis because of coupling between electromechanical entities and stress concentration at interfaces. Three-dimensional piezoelectricity solutions can predict accurately the complex behaviour of piezoelectric laminated plates and also act as benchmark for assessing various approximate 2D theories. Further, these 3D solutions help for making the suitable kinematics or kinetics assumptions for the development of 2D theories. The 3D analysis were applied to analyse the all round simply supported plates. There are very limited articles reported about the development of 3D analysis of piezoelectric plates subjected to arbitrary boundary conditions. In this paper, a systematic mathematical development of governing equations for smart laminated plate is presented. The governing partial differential equations for plates are reduced to ordinary differential equations in the thickness ( $z$ ) and in-plane ( $x$ ) directions by applying the recently developed multi-term multi-field extended Kantorovich method in conjunction with Fourier series along  $y$ -direction which satisfies the Levy-type support conditions along the  $y$ -axis. The accuracy and efficacy of this method is verified thoroughly by comparing it with the existing results in the literature and FE solutions. The numerical results are presented hybrid composites and sandwich plates.

### Biography

Poonam Kumari has completed her Master's and PhD in Solid Mechanics from Department of Applied Mechanics of IIT Delhi. She worked as Postdoctoral Fellow at School of Engineering of Simon Fraser University, BC Canada. Presently she is working as Assistant Professor at Department of Mechanical Engineering of IIT Guwahati. She published 22 papers in reputed International Journals. She developed analytical three-dimensional mathematical models of hybrid laminated plates subjected to arbitrary support conditions. Recently, 3D solution of longitudinally functionally graded plate subjected to arbitrary boundary conditions is developed.

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