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On Gibbs-phenomenon-free Fourier solution for finite shear-flexible laminated clamped curved panels. (English) Zbl 0828.73045

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An analytical solution to a boundary value problem of static response and free vibration of a rigidly clamped arbitrarily laminated shear-flexible doubly-curved shell of rectangular planform is presented. A boundary- continuous-displacement based on double Fourier series approach, designed to avoid Gibbs phenomenon, is developed to solve the boundary value problem, involving five highly coupled linear partial differential equations with constant coefficients derived from Sanders' FSDT.

Extensive numerical results presented in this paper include: convergence characteristics of computed deflections, moments and natural frequencies; effects of length-to-thickness ratio, radius-to-length ratio, fiber orientation angle, lamination sequence and shell geometry on the response quantities of interest. Also, the highly complex interaction among bending-stretching type coupling effect, membrane action due to shell curvature, and the effects of transverse shear deformation and rotatory inertia are investigated.

A much-needed generalization of the Navier approach is given for obtaining Gibbs-phenomenon-free analytical or strong form of solutions to the unsolved problems of static response and free vibration of moderately thick arbitrarily laminated doubly-curved panels of rectangular planform with the rigidly clamped boundary conditions prescribed at all edges. The assumed solutions are in the form of double Fourier series, which satisfy the rigidly clamped boundary conditions a priori in a manner similar to the conventional Navier method.

Reviewer: [Z.F.Baczyński \(Warszawa\)](#)

MSC:

[74K15](#) Membranes
[74E30](#) Composite and mixture properties
[74S30](#) Other numerical methods in solid mechanics (MSC2010)
[42B05](#) Fourier series and coefficients in several variables

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[generalization of Navier approach](#); [analytical solution](#); [boundary value problem](#); [free vibration](#); [rectangular planform](#)

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