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Author's reply ☆

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Professor Maurizi is thanked for his interest in Ref. [1]. Professor Maurizi commented on the paper and brought to the attention of the present writer the papers by Lee and Saibel [2], Saibel [3], Grief and Mittendorf [4], Mittendorf and Grief [5] and Maurizi and Robeldo [6]. Refs. [2,3] are expositions of approximate methods with one or two example results. In Refs. [4,5] Rayleigh–Ritz-based approximate methods via Fourier series were used. These references stress that it was necessary to use Stokes transformation to differentiate the series correctly and that Lagrange multipliers were used to ensure displacement or slope continuity. Some recent publications using Fourier series were briefly reviewed in Ref. [1].

Elementary mathematics, and the simple theory of bending were used in the theoretical analysis in Ref. [1]. The frequency equations were presented in 'exact' form as a fourth order determinant equated to zero. The elements of the determinant are transcendental functions. Any number of natural frequencies may be calculated, limitations being computer rounding off errors and the like. The Fourier series can asymptotically approach any smooth function and has been used extensively in solving mathematical and engineering problems. Problems arise with discontinuous functions where the error in the vicinity of the discontinuity can be substantial. This is known as the Gibb's effect and has received attention in several publications. Tadikonda and Baruh [7] discussed the Gibb's effect and convergence issues of a simply supported beam with an intermediate torsional spring. Account must be taken of the Gibb's effect at the steps for a Fourier series-based solution of the problem in Ref. [1]. The present writer feels that the effort will be laborious and not suitable. Straightforward Rayleigh–Ritz or finite element modeling is a better option. The tabulations in Ref. [1] may be used to judge the quality of the results obtained by the approximate methods.

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