Readers' Forum

Comment on "Green's Function and Receptance for Structures Consisting of Beams and Plates"

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In his recent article, Kelkel[1] uses the receptance method and the method of superposition[2] to determine the Green's function for vibrating beam-stiffened rectangular plates with free edges, thus facilitating the computation of the natural frequencies of such structures. We are somewhat alarmed by the author's failure to reference the substantial body of prior work in the area of free vibration analysis of beam-stiffened plates. In particular, a similar article by Nicholson[3] appeared in this journal 18 months prior to Kelkel's. Neither Nicholson nor any of the references therein were cited.

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To the authors' knowledge, Nicholson was the first to apply Green's function methods to the computation of natural frequencies and modes of beam-stiffened plates. The method developed therein is general and when applied to plates with stiffeners parallel to the edges and with simply supported edges perpendicular to the stiffeners results in characteristic equations which can be solved for the exact natural frequencies of the structure. For plates with other boundary conditions, solutions can still be obtained. However, the exact nature of the solution will be lost due to truncation of infinite series, as demonstrated by Kelkel.

We wish to note, also, that a general solution to the forced vibration problem for the beam-stiffened plate by modal analysis requires an orthogonality relation for the natural modes,[4,5] which is not immediately forthcoming from receptance methods.

References

[1]Kelkel, K., "Green's Function and Receptance for Structures Consisting of Beams and Plates," *AIAA Journal*, Vol. 25, Nov. 1987, pp. 1482–1489.

[2]Gorman, D. J., *Free Vibration Analysis of Rectangular Plates*, Elsevier, New York, 1982.

[3]Nicholson, J. W., "Free Vibration of Stiffened Rectangular Plates Using Green's Functions and Integral Equations," *AIAA Journal*, Vol. 24, March 1986, pp. 485–491.

[4]Nicholson, J. W. and Bergman, L. A., "Free Vibration of Combined Dynamical Systems," *ASCE Journal of Engineering Mechanics*, Vol. 112, Jan. 1986, pp. 1–13.

[5]Bergman, L. A. and Nicholson, J. W., "Forced Vibration of a Damped Combined Linear System," *ASME Journal of Vibration, Acoustics, Stress and Reliability in Design*, Vol. 107, July 1985, pp. 275–281.