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LETTERS TO THE EDITOR

COMMENTS ON "THE RESPONSE OF AND SOUND POWER RADIATED BY A CLAMPED RECTANGULAR PLATE"

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Sung and Jan [1] have analyzed the dynamic response of a clamped rectangular plate excited by steady state harmonic point forces, couples and piezomoments. The authors must be congratulated for performing sound radiation calculations and also conducting sound radiation measurements in a reverberant room equipped with an anechoic chamber. Good agreement between analytical and experimental results is obtained [1].

On the other hand the writer feels that the treatment made by the authors [1] of the forced vibrations situation inadvertently omits valuable references which essentially deal with the same analytical formulation. As stated by Leissa in his classical treatise, "the problem of C–C–C–C rectangular plates has received a voluminous treatment in the literature, especially for the case of a square plate" [2].

Tomotika [3] was the first author to obtain an exact solution and determined the fundamental frequency for the square plate with excellent accuracy. In a well known paper Young obtained the lower natural frequencies of rectangular plates, including the clamped configuration, using the Rayleigh–Ritz method [4]. The plate displacement amplitudes were approximated using "beam functions", as employed by Sung and Jan [11].

It is important to point out that from the point of view of using characteristic beam functions the works by Young and Felgar Jr. [5] and by Felgar Jr. [6] are extremely valuable. This last publication contains formulae for integrals needed in free and forced vibrations situations when beams functions and variational formulations are employed in the analysis of vibrating plates.

It may be useful to recall that Warburton [7] presented the first comprehensive collection of approximate, fundamental frequency coefficients of rectangular plates, employing beam functions and the Rayleigh–Ritz method. Reference [8] presents a brief survey of studies dealing with free and forced vibrations problems making use of simple polynomial approximations which satisfy, at least, the essential boundary conditions of vibrating plates. A method for developing co-ordinate functions which are combinations of sinusoidal terms and polynomials has recently been developed [9, 10]. Its use, however, has been limited to free vibrations situations.

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AUTHOR'S REPLY

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I would like to thank Professor Laura for his calling attention to additional literature [1–5] pertinent to the title problem. I have to apologize that because it is not easy to survey all the relevant literature in my information system, I could not obtain the total literature in this field when preparing the original paper. Besides, the original paper [6] was sent to JSV in Oct. 1995, therefore, it was not possible to reference articles [7–9]. Although beam functions were employed to approximate the plate displacement amplitude, readers may find that the paper focuses mostly on the simulation of the excitation of a piezoceramic patch by four point moments and the solution of the forced response has been used to predict the radiated sound power. Finally, the results which have been verified experimentally in the anechoic environment indicate that the four point moment estimation provides an accurate estimation of plate response and structurally radiated sound power.

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