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LETTERS TO THE EDITOR

COMMENTS ON "USE OF THE ANALYTICAL AND NUMERICAL COMBINED METHOD IN THE FREE VIBRATION ANALYSIS OF A RECTANGULAR PLATE WITH ANY NUMBER OF POINT MASSES AND TRANSLATIONAL SPRINGS"

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We find the title paper both useful and very interesting and we would like to congratulate the authors to their work [1]. On the other hand it is also the purpose of this letter to add some pertinent references which have been inadvertently omitted by the authors.

Reference [2] deals with elastically restrained beams and plates carrying concentrated masses. Rotatory inertia of the masses is also taken into account. Simply supported or clamped edges turn out to be particular, limiting situations.

The case of a simply supported rectangular plate carrying an elastically mounted mass has been treated in reference [3]. Reference [4] deals with a circular plate elastically restrained against rotation along the edge and carrying an elastically mounted mass. Obviously the situation where the mass is rigidly attached to the plate constitutes a limiting case.

One should recall that when the mass is elastically mounted on a structural element the original frequencies and mode shapes of the "bare" structure are, in general, drastically changed. A similar situation arises in nuclear physics [3].

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AUTHORS' REPLY

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First of all, we wish to express our sincere appreciation to the valuable comments of Dr. D. R. Avalos and H. A. Larrondo. In general, most of the techniques presented in the

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existing literatures have some limitations. For example, the theory presented in reference [2] is available for the determination of the *fundamental* frequency of beams and plates, and those of references [3] and [4] are suitable for the case of a *single* concentrated mass.

Actually, the boundary conditions of the rectangular plates presented in reference [1] are arbitrary and to use the SSSS and SCSC boundary conditions is only for simplicity. Although there exists only one requirement for the analytical and numerical combined method (i.e., the *pure* ANCM) presented in reference [1], namely that the analytical (closed-form) solutions for the natural frequencies and the normal mode shapes of the *unconstrained* rectangular plate (*without* any concentrated elements attached) must be obtainable. This last limitation has now been violated by the *quasi* ANCM presented in reference [5], where the analytical (closed-form) solutions are replaced by the numerical ones. In other words, the existence of rotatory inertia, elastic mounting and/or elastic restraint will not affect the availability of the ANCM presented in reference [1]. In fact, even with the *pure* ANCM, the rotatory inertias of the lumped masses have been taken into account in reference [6], and the case of a rectangular plate carrying an elastically mounted mass was also studied in reference [5].

It seems important to note that *the key purpose* of the ANCM presented in references [1], [5] and [6] aims at determining *any number* of natural frequencies and the corresponding *mode shapes* of beams and plates carrying *any number* of concentrated elements with lower CPU time. It is also worthy of mention that the *mode shapes* of the beams and plates are neglected in most of the existing literature, but this is not true of references [1], [5] and [6].

The authors wish to thank Dr. D. R. Avalos and H. A. Larrondo again, since their kind comments stimulated us to analyse the free vibration of a rectangular plate carryng *any number* of elastically mounted lumped masses; this work will be finished soon.

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