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LETTERS TO THE EDITOR

COMMENTS ON "APPLICATION OF THE STRAIN ENERGY DAMAGE DETECTION METHOD TO PLATE-LIKE STRUCTURES"

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In this very useful and interesting paper [1] Cornwell *et al.* investigate the problem of using experimentally determined modal parameters to detect and locate damage in plate-like structures. The authors have successfully extended the method originally proposed by Stubbs *et al.* [2, 3] and limited to structural elements characterized by one-dimensional curvature and to plate-type structures which possess two-dimensional curvature.

The writers are presently undertaking a research program considerably more modest than the one reported in reference [1] by considering first a virgin and then a damaged circular plate.

The writers also consider it reasonable to assume that in a real physical situation where a structural element has been damaged the domain D may be thought to be composed, roughly, of three subdomains:

$$D = D_v + D_a + D_d, \tag{1}$$

where D_v is the partition of the original domain D which is characterized by the constitutive properties of the virgin structural element, D_a is the subdomain where the material properties have been affected by the damaging process and they may possess anisotropy combined with plastic or even viscoelastic behavior, and finally, D_d which is the subdomain where the localized damage, e.g., a crack, has appeared. The total strain energy will be a summation of the individual strain energies of each partition and the modal shapes will be influenced by the constitutive laws which characterize each subdomain. Admittedly, defining each partition and its constitutive relations is not a simple task but it could be attempted first under controlled laboratory conditions.

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REFERENCES

1. P. Cornwell, S. W. Doebling and C. R. Farrar 1999 *Journal of Sound and Vibration* **224**, 359–374. Application of the strain energy damage detection method to plate-like structures.
2. M. Stubbs, J. T. Kim and K. Topole 1992 *Proceedings of the ASCE* 10*th Structures Congress*, 543–546. An efficient and robust algorithm for damage localization in offshore platforms.
3. N. Stubbs, J. T. Kim and C. R. Farrar 1995 *Proceedings of the* 13*th International Modal Analysis Conference*, 210–218. Field verification of a nondestructive damage localization and sensitivity estimator algorithm.