

the modes are normalized to unit model mass. The results are summarized in Table 3 along with those computed by overall finite difference with  $\Delta z = 0.001$ . The results agree with one another very well.

### Concluding Remarks

Exact formulas for computing eigenvalue sensitivity with respect to location of in-span occurrence have been derived in this Note based on normal mode method. The results showed that for in-span occurrence with a single interface force, the eigenvalue sensitivity depends on the slope of eigenfunction as well as a force term which depends on the specific occurrence.

These formulas depend only on the eigensolutions and can be evaluated at almost no additional cost. For a specific problem, the eigenvalue sensitivity formula can be used qualitatively to determine the effect of moving one of the discrete occurrences. The quantitative data can be used to find locations of in-span occurrences to maximize the fundamental eigenvalue of a structure member.

### References

<sup>1</sup>Adelman, H. M., and Haftka, R. T. (eds.), *Sensitivity Analysis in Engineering*, NASA CP 2457, NASA Langley Research Center, Hampton, VA, 1986.

<sup>2</sup>Adelman, H. M., and Haftka, R. T., "Sensitivity Analysis of Discrete Structural Systems," *AIAA Journal*, Vol. 24, No. 5, 1986, pp. 823-832.

<sup>3</sup>Huang, E. J., Choi, K. K., and Komkov, V., *Design Sensitivity Analysis of Structural Systems*, Academic Press, New York, 1986.

<sup>4</sup>Arora, J. S., and Huang, E. J., "Methods of Design Sensitivity Analysis in Structural Optimization," *AIAA Journal*, Vol. 17, No. 9, 1979, pp. 970-974.

<sup>5</sup>Hou, J. W., and Chuang, C. H., "Design Sensitivity Analysis and Optimization of Vibrating Beams with Variable Support Locations," *16th Automation Conference, ASME Transactions*, Chicago, IL, Sept. 1990; also, *Journal of Mechanisms, Transmissions, and Automation in Design* (to be published).

<sup>6</sup>Rozvany, G. I. N., and Mroz, Z., "Column Design: Optimization of Support Conditions and Segmentation," *Mechanics of Structures and Machines*, Vol. 5, No. 3, 1977, pp. 279-290.

## Errata

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### Review of Computational Methods in Hypersonic Aerodynamics

G. V. Candler

*University of Minnesota,  
Minneapolis, Minnesota 55455*

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THE University of Minnesota was inadvertently printed as the University of Minneapolis. We regret this error.