

Readers' Forum

Brief discussion of previous investigations in the aerospace sciences and technical comments on papers published in the AIAA Journal are presented in this special department. Entries must be restricted to a maximum of 1000 words, or the equivalent of one Journal page including formulas and figures. A discussion will be published as quickly as possible after receipt of the manuscript. Neither the AIAA nor its editors are responsible for the opinions expressed by the correspondents. Authors will be invited to reply promptly.

Comment on "Structural Damage Detection by Generic Algorithms"

Menahem Baruch*

*Technion—Israel Institute of Technology,
32000 Haifa, Israel*

IN a recent interesting paper,¹ Moslem and Nafaspour describe generic algorithms for the detection of structural damage. However, it is not clear from the paper¹ how the analytical and measured

mode shapes have been normalized. It seems that a proper normalization and an optimal orthogonalization^{2,3} of the measured mode shapes can improve the proposed algorithms.

In the paper¹ it is assumed that the mass matrix does not change. This means that the reference basis of the proposed method is the mass matrix. However, this assumption has a much deeper meaning. One can find a theoretical proof⁴ that the mass and stiffness matrices cannot be identified simultaneously by using only modal data. In this case, there exists an infinite number of solutions, and by using only modal data, one would pick one of these infinite number of solutions.

References

¹Moslem, K., and Nafaspour, R., "Structural Damage Detection by Generic Algorithms," *AIAA Journal*, Vol. 40, No. 7, 2002, pp. 1395–1401.

²Baruch, M., and Bar-Itzhack, I. Y., "Optimal Weighted Orthogonalization of Measured Modes," *AIAA Journal*, Vol. 16, No. 4, 1978, pp. 346–351.

³Baruch, M., "Orthogonalization of Measured Modes—Revisited," *AIAA Journal*, Vol. 35, No. 4, 1997, pp. 744, 745.

⁴Baruch, M., "Modal Data Are Insufficient for Identification of Both Mass and Stiffness Matrices," *AIAA Journal*, Vol. 35, No. 11, 1997, pp. 1797, 1798.

Received 24 August 2002; accepted for publication 13 November 2002. Copyright © 2003 by the American Institute of Aeronautics and Astronautics, Inc. All rights reserved. Copies of this paper may be made for personal or internal use, on condition that the copier pay the \$10.00 per-copy fee to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923; include the code 0001-1452/03 \$10.00 in correspondence with the CCC.

*Professor Emeritus, Faculty of Aerospace Engineering.

A. Berman
Associate Editor