INVESTIGATION ON APPARENTLY RELATED MODES IN ESPERIMENTAL MODAL ANALYSIS

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EXTENDED ABSTRACT

Experimental modal analysis has grown to become common practice over the last years. A relevant part of its success is due to the wide variety of uses that the results provided by this analysis can offer. In the cases presented in this paper, for instance, it shows to be useful to solve stability, resistance and alignment problems, although its application area is limited by linearity constraints.

The experimental modal analysis presented in this paper was made on steel supports by using the Siemens LMS Test.Lab Software. Since the tested supports resulted both isotropic and elastic within the boundaries of the experiments, then the results of the measurements were compared with linear correlation tools, such as the MAC matrix.

This paper is aimed at presenting a methodology for the experimental modal analysis to investigate the dynamical behaviour of mechanical components. Analytical justifications to peculiar phenomena registered during experiments were also provided. These phenomena mainly regarded the presence of apparently non-orthogonal related modes, thus violating the basic properties of vibration modes. Three distinct analytical observations are reported to justify these non-expected observed effects.

In order to exemplify the previous analytical findings, it was chosen to analyse two datasets relative to table-like supports presenting all the aforementioned critical aspects.

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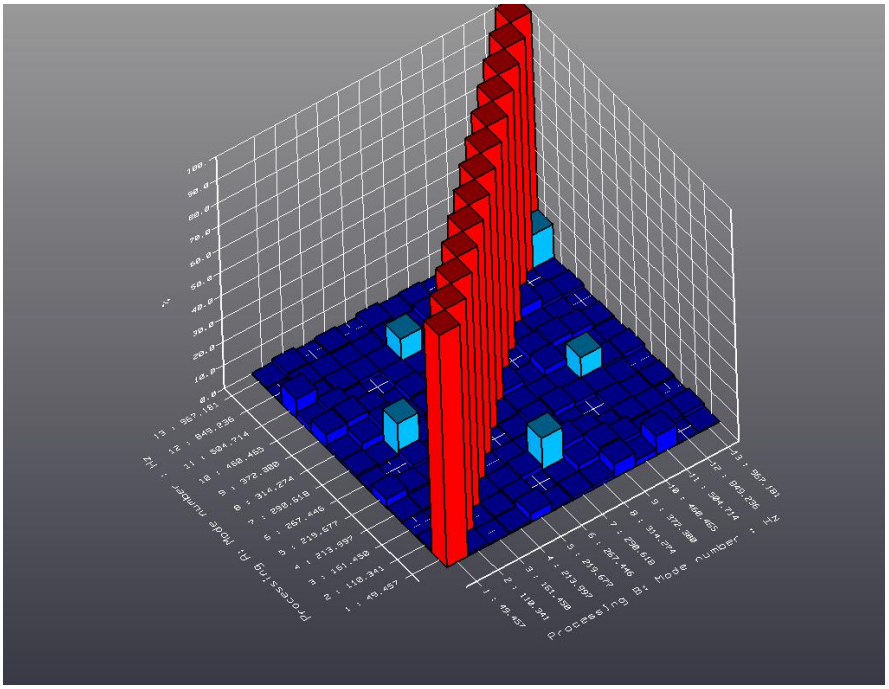

Figura 1. Example of MAC matrix showing three couples of apparently related modes.

REFERENCES

[1] Ewins, D.J. (2001). "*Modal Testing: Theory, Practice and Applications*". Research Studies Press LTD.
[2] Fasana, A., Marchesiello, S. (2006). "*Meccanica delle vibrazioni*". CLUT.