
Identification of Eigenmodes in Vibration Data

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Summary. Vibration is the response of a system to an internal or external stimulus causing it to oscillate. Vibration causes dynamic stress if the system is excited at the same frequency as the so called Eigenmodes and this can damage the system [2]. Thus, the identification of Eigenmodes in vibration data is an important issue in the aerospace industry, e.g. jet engines need to be certified before going into service and any dangerous vibration has to be detected. This data is usually analysed manually, since this a timeconsuming process, machine learning can be applied in order to support engineers in their work. The vibration data is usually visualised as 2D images (campbell plots) and the Eigenmodes are displayed as lines.

We introduce an iterative algorithm using background knowledge for the identification of Eigenmodes. Our algorithm extends the original Hough Transform [3, 1], an image processing algorithm used for detection of lines and other parametrisable shapes. Finally we show in our evaluation that our approach for identifying Eigenmodes, applied on a data set provided by a major European jet engine manufacturer, outperforms the prediction of the Finite Element Model and is competitive to the base model using lab measurements.

Key words: Vibration Data, Image Processing, Hough Transform

References

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