



GENERALITAT
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PATENTES



UNIVERSITAT
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TITLE Method for Characterizing Discontinuity Based on the Predictability of Ultrasounds

DESCRIPTION OF THE TECHNOLOGY

Researchers at the Universitat Politècnica de València have developed a non-destructive method that is easy to apply and capable of recognizing the general condition of all kind of materials in real time, which avoids possible security problems caused by the poor conditions of those materials.

This method, based on advanced techniques of signal processing, is able to analyze determinism of signals obtained by an ultrasonic inspection of the materials. Variation in this parameter shows possible damages to the material.

The results of this research come from a collaboration of researchers at the Institute for Telecommunications and Multimedia Applications (iTEAM) and the Concrete Science and Technology Institute (ICITECH) at UPV.

With this technique, patented by the Universitat Politècnica de València, it is possible to quantify the material damages more precisely than with the usual techniques. It does so by characterizing the internal structure of the material in different frequency ranges, which guarantees stricter quality controls.

It is a more competitive method than techniques being used currently, such as measuring speed and attenuation. It has several benefits, including the assessment of overall damages to a material, and the fact that the measurement parameter is normalized between 0 and 1. This makes understanding the results easier, and allows performing an analysis of the frequency in proportion to the extent of the damage.

MARKET APPLICATION SECTORS

It has multiple applications in fields such as aeronautics, naval and motor engineering for the continuous monitoring of the fuselage. In this industry, due to the high load that they endure, as well as fatigue cycles, abrupt temperature and pressure changes, it is necessary to periodically check the state of hulls, airplane wings, car bodyworks, etc.

In addition, in the field of civil engineering and construction, this new method can be used to detect damages in bridges, inspect pillars and resistant elements in buildings and assess defects in constructions affected by natural disasters, corrosion in marine environment, etc.

Other possible fields of application are the state control of the industrial venues, the inspection of energy transportation systems such as oil or gas pipelines, and even the quality control of 3D printing parts.

TECHNICAL ADVANTAGES AND BUSINESS BENEFITS

- It does not need a previous calibration period. Today, non-destructive testing techniques require a specific calibration process for the unit before carrying out measures for distinguishing between the effect caused by the material analyzed and the effect caused by the instrumentation used (function generator, transducers, etc.) This new technique comes from the hypothesis that incident signal is determinist and it does not need any other parameter relative to the triggering signal. Thus, the application of this technique is easier.
- It does not require knowledge about the initial state of the material. The other detection techniques of overall damages in materials require applying the same test on the same material in the initial state. The control measure proposed in this patent allows researchers to evaluate if the state of the material is appropriate.



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- The curves of determinism against the frequency provide an assessment of the size of discontinuity. Besides characterizing the overall state of the material, the technique developed by researchers at UPV provides an assessment of the size of the damage (crack, fissure, etc.)
- The end user does not require advanced technical knowledge. Once the technique is implemented, the results are easy to understand even for technicians/specialists outside the field of signal processing.
- Since it works with continuous input signals and not with a pulse, the energy of the input signal is high and the energy of the output signal that will be analyzed is also higher and more immune to the sound of the acquisition system.

CURRENT STATE OF DEVELOPMENT

The team of researchers has both a laboratory and a field research unit.

INTELLECTUAL PROPERTY RIGHTS

On February 25, 2016, the Universitat Politècnica de València requested patent protection at the Spanish Patent and Trademark Office, with reference P201531877.

COLABORATION SOUGHT

The UPV is searching for companies interested in establishing agreements to patent the license. The UPV is searching for companies interested in establishing agreements to patent the license.

RELATED IMAGES



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