Strain detection of wind turbine blades

Do wind turbine blades have damage and damage detection methods?
Therefore, it is of great significance to monitor the structural health of wind turbine blades to avoid the failure of wind turbine outages and reduce maintenance costs. This paper reviews the commonly observed types of damage and damage detection methods of wind turbine blades.

What are the methods used for wind turbine blade health monitoring?
At present, the methods used for wind turbine blade health monitoring include acoustic emission, vibration detection, strain detection, aerodynamics, machine vision, thermal and sound-based features, etc. In this review, we analyze different damage detection techniques for wind turbine blades through a search of the Web of Science core collection.

What are the nondestructive detection methods of wind turbine blades?
In Section 3,three fault diagnosis and detection methods of wind turbine blades are reviewed,among which the nondestructive detection methods include acoustic emission,ultrasonic,strain measurement,thermal imaging,machine vision,and other methods. The basic principles,advantages,and disadvantages of each method are summarized.

Which damage detection methods are used in turbine blades?
Then,four highly influential damage detection methods,namely the transmittance function,wave propagation (WP)-,impedance (IMP)- and vibration (VIB)-based methodsare comprehensively reviewed along with their applications. Finally,current issues that face the development of effective damage detection methods of turbine blades are discussed.

How do you detect damage from wind turbine blades?
Visual inspectionis a common engineering damage detection method used for wind turbine blades. Xiao et al. used an unmanned aircraft to collect images of wind turbine blades,which they combined with an Alexnet classifier to automatically diagnose blade surface damage.

Can acoustic signals detect wind turbine blade damage?
This paper firstly introduces the existing wind turbine blade detection methods and reviews the research progress and trends of monitoring of wind turbine composite blades based on acoustic signals. Compared with other blade damage detection technologies, acoustic emission (AE) signal detection technology has the advantage of time lead.

understanding loads of the wind turbine blade. Typically wind turbines are designed for a 20-year operational life, and during that time the sensor will undergo approximately 60 million cycles. A ...

The damage detection of a wind turbine blade enables better operation of the turbines, and provides an early

alert to the destroyed events of the blade in order to avoid catastrophic losses. A new non-baseline damage ...

With global warming and the depletion of fossil energy sources, renewable energy is gradually replacing non-renewable energy as the main energy in the future. As one of the fastest growing renewable energy sources, ...

Therefore, by implanting the AE sensor into the wind turbine blades, real-time health monitoring [56], b vibration analysis [57], c optical interferometry [58], d radiography ...

Wind power is growing rapidly as a green and clean energy source. As the core part of a wind turbine, the blades are subjected to enormous stress in harsh environments over a long period of time and are therefore ...

thermal imaging, vibration, etc., have been applied in the detection of wind turbines. Blade damage detection based on strain measurements indirectly assesses blade damage through ...

A FEM model of a 2.5meter- -long wind turbine blade with 40 virtual FBGs strain sensors was used to obtain strain data under normal operational conditions. Then, strain ... early damage ...

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A new method of calibrating and processing strain gauge data on wind turbine blades has been described. It is currently being used to monitor a full scale bi-axial fatigue test. Early results ...

In this study, we propose a damage detection approach for rotating wind turbine blades using the local flexibility method based on the dynamic macro-strain signals measured by long-gauge fiber Bragg grating ...

In the context of China"s "double carbon" target, the scale of wind power generation is increasing, with a total installed capacity of 340 million kW by the end of 2021 [].As the core component of ...

One of the essential parts of a wind power generator that captures wind energy is the wind turbine blade. The safety of the blades rapidly declines as a wind turbine"s operating ...

Detecting damage to a wind turbine blade is important for planning blade repair, avoiding aggravated blade damage, and extending the sustainability of blade operation. This paper firstly introduces the existing wind ...

Common damage types in wind turbine blades were reviewed by Sørensen et al. (Reference Sørensen, Jørgensen, Debel, Jensen, Jensen, Jacobsen and Halling 2004), with the presented damage types being based on observations from ...

Strain-measurement-based detection technology focuses on detecting minute changes in the length or

deformation of wind turbine blades by using strain sensors under external excitation . Direct strain (e = x/l) and shear ...

A new non-baseline damage detection method based on the Fiber Bragg grating in a wind turbine blade using the feature information fusion (FIF) method to fuse and optimize ...

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