NDE PATENTS

Compiled by Dr. Shyamsunder Mandayam

We restarted this feature from the June 2022 issue of JNDE.

Through this feature every quarter, we intend to provide you a snapshot of some latest and important patents in the world of NDE. We also intend to use this feature to encourage the Indian NDE community to file more patents based on your innovations. We will be happy to provide guidance and assistance in different ways – Answering queries, Conducting Tutorials and webinars, One-on-one discussions, Networking with Intellectual property experts, etc.

Need help understanding, What are Patents? Why to Patent? When to Patent? What is the Patenting Process? …… Please feel free to reach out to me by email at mandayam.shyamsunder@gmail.com

Here we list below a few interesting patents related to ***NDE and Inspection using Infrared Imaging / Thermography.***

United States Patent 10,728,426

Contrast based imaging and analysis computer-implemented method to analyze pulse thermography data for nondestructive evaluation

Inventors: Koshti; Ajay M.

Assignee: United States of America as represented by the Administrator of the National Aeronautics and Space Administration (Washington, DC)

Methods and systems for analyzing and processing digital data comprising a plurality of infra-red (IR) video images acquired by a pulse thermography system are used to compute video data from the raw and smoothed video data acquired for the performance of non-destructive evaluation. New video data types computed may include but are not limited to contrast evolution data such as normalized contrast, converted contrast and normalized temperature contrast. Additionally, video data types computed comprise surface temperature, surface temperature rise and temperature simple contrast.

United States Patent 11,249,039

Method of measuring depth of defects in large-scale wind turbine blade using infrared thermography

Inventors: Zhou Bo

Assignee: Shenyang University of Technology (Liaoning, CN) Shenyang Daxingcheng Energy Technology Co., Ltd (Liaoning, CN)

The invention relates to the technical field of operation and maintenance of wind turbines, and is also applicable to non-destructive measurement of a depth of a defect of other resin-based composite materials. It is aimed at the problem that the depth of the defect cannot be determined by an intuitive infrared thermal image in the measurement of a depth of a defect of a large wind turbine blade. This method not only ensures accuracy of the measurement, but can also be widely applied. The method comprises the following steps: S1: continuously heating a surface of a wind turbine blade with an irradiation heat source; S2: collecting and storing a real-time heat map sequence of a surface of the blade with an NEC R300 infrared thermal imaging camera; S3: extracting a surface temperature rise curve at a defect location and organizing the results into a temperature rise curve family of the layers in a depth direction at the defect location; S4: extracting a surface temperature rise curve at a non-defect location, and calculating the similarity between the two temperature rise curve families; S5-S7: obtaining a reference depth value of the defect; and S8: determining whether the depth value is in a characteristic interval.

United States Patent 11,218,112

Silicon photovoltaic cell scanning eddy current thermography detection platform and defect classification method

Inventors: He Yigang, Du Bolun , Zhang Yaru, Duan Jiajun, He Liulu

Assignee: WUHAN UNIVERSITY (Hubei, CN)

The disclosure provides a silicon photovoltaic cell scanning eddy current thermography detection platform and a defect classification method. The technical solution adopted by the disclosure is: firstly, fixing the position of the electromagnetic inductive coil and the thermal imager, and using the main conveyor belt to carry the silicon photovoltaic cell to move forward on the production line to form a scanning eddy current heating of the silicon photovoltaic cell. Secondly, the defect temperature information is obtained through the thermal imager in terms of thermal image sequences. Thirdly, the feature extraction algorithms are used to extract the silicon photovoltaic cell defect features. Finally, the image classification algorithms are used to classify the silicon photovoltaic cell defects, and the sorting conveyor belts are used to realize the automatic sorting of silicon photovoltaic cells with different types of defects on the production line.

United States Patent 11,054,376

Method for inspecting composite structures using quantitative infra-red thermography

Inventors: Villette Thibault, Traidia Abderrazak

Assignee: Saudi Arabian Oil Company (Dhahran, SA)

A system and method for inspecting a surface of a structure for defects includes an inspection apparatus having a heating device for heating a section of the surface of the structure, an infrared camera for receiving infrared radiation from the surface in response to heating, a controller configured to generate thermographs from the received infrared radiation, and a communication device. A training system includes an expert system module configured to determine correlations between a set of thermographs generated by a thermal simulation of modeled structural elements with defects, and parameters of the modeled structural elements. A computer system communicatively coupled to the training system and the inspection apparatus, is adapted to receive thermographs received from the inspection apparatus and to detect quantitative parameters of defects in the structure using the correlations obtained from the training system.

United States Patent 10,908,068

Thermography image processing with neural networks to identify corrosion under insulation (CUI)

Inventors: Amer Ayman, Al Shehri Ali, Parrott Brian, Sarraj Mohammed

Assignee: Saudi Arabian Oil Company (Dhahran, SA)

A method for identifying corrosion under insulation (CUI) in a structure comprises receiving thermographs from the structure using an infrared camera, applying filters to the thermograph using a first machine learning system, initially determining a CUI classification based on output from the filters, and validating the initial CUI classification by an inspection of the structure. The first machine learning system is trained using results of the validation. Outputs of the first machine learning system and additional structural and environmental data are fed into a second machine learning system that incorporates information from earlier states into current states. The second machine learning system is trained to identify CUI according to changes in the outputs of the first machine learning system and the additional data over time until a second threshold for CUI classification accuracy is reached. CUI is thereafter identified using the first and second machine learning systems in coordination.