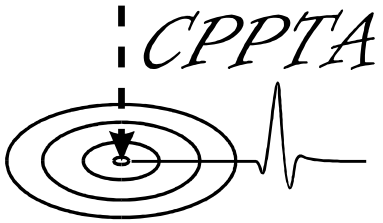

BOOK OF ABSTRACTS

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Comparative analysis between thermography studies and electric measurement of partial discharges in underground power cables

A. González-Parada ✉, R. Guzmán-Cabrera, J. Rosales-García, M. Guía-Calderon

University of Guanajuato, Engeneering Division, Carr. Salamanca-Valle de Santiago Km 3.5+1.8 Km. Comunidad de Palo Blanco, 36885 Salamanca, Gto. Mexico

✉ gonzaleza@ugto.mx

A partial discharge is a non linear phenomenon of electrical breakdown that is confined and localized in the region of an insulating medium between two conducting materials which are at different potentials. The damage of the insulating material, which is subjected to an AC voltage during the discharge process, can be directly or indirectly measured by the bombardment of energetic electrons.

In a under ground power cable installation the main point of failure are the accessories that connect it to other equipment, like terminals or splices. By this reason the onset failure is a big deal in the maintenance of under ground power installation.

In this paper a comparative study between the electrical measurements of onset PD and thermography images is presented. The study was carried out with specific faults in the installation of accessories, their evolution being monitored by inductive electric sensors and correlating the results with thermographic images taken during test development.

The thermographic image analysis is made by digital image processing algorithm. An approach is proposed to effectively analyze digital, based on texture segmentation for the detection of early failure stage. The proposed algorithm was tested and compare with the measurements obtained from electrical sensor in the failure point. The result was found to be absolutely suitable to distinguish onset failures from the background tissue using morphological operators and the extract them through machine learning techniques and a clustering algorithm for intensity-based segmentation.

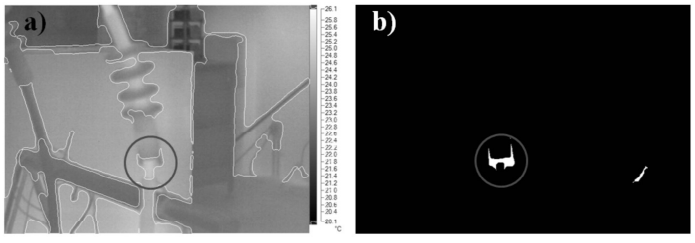

Fig. 1. Termographic image of a failure point.

The incidence of shrinkage due to the polymerization process creates stresses within the material and its interface with the tooth structure. Accordingly, marginal failures can occur, affecting the integrity of the restoration [2].Thin vertical cracks are usually difficult to detect by conventional optically stimulated thermography, due to heat flows being mainly generated and then propagating in a direction perpendicular to the surface. An intensity-modulated optical stimulation targeted near the dental restoration interface was selected as excitation source. The amplitude or phase images obtained after the lock-in procedure will bear information on the presence of the crack, carried by a perturbation of the amplitude or phase of the thermal wave.

Temperature rise during polymerization of light-activated giomers with a LED unit in continuous stimulation mode (1000mW/cm^2 and applied polymerization time 2x20s) was measured with an IR camera (FLIR 7200 series, sensitive in the 1.5 μm – 5.1 μm wavelength range). The peak polymerization temperature of the investigated samples ranged between 27^{0}C – 61^{0}C.

The polymerization process of the samples was also investigated by photopyroelectric calorimetry, in front detection configuration. Assuming a thermally thin regime for the sensor and thermally thick for the sample (particular case of detection in which the amplitude of the signal is proportional to the reciprocal of thermal effusivity), a calibration of the amplitude of the signal was possible by performing a room temperature frequency scan of the signal's phase in the solid state. The resulted values of thermal effusivity (around 1000 Ws$^{1/2}$m^{-2}K^{-1}) showed good thermal biocompatibility of the materials both in liquid and solid state.

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Optical properties of human skin around Biological Active Points

M. Vargas-Luna [1], R Guzmán-Cabrera [2] ✉, I. Delgadillo-Holtfort [1],
R. Huerta-Franco [3], E. A. Pérez-Alday [1], T. Cordova-Fraga [3]

[1] Departamento de Ingeniería Física, Universidad de Guanajuato, Campus León
[2] División de Ingenierías, Campus Irapuato-Salamanca, Universidsad de Guanajuato
[3] Departamento de Ciencias Aplicadas al Trabajo, Universidad de Guanajuato, Campus León

✉ guzmanc@ugto.mx

The physical parameter for the so called Biologically Active Points most documented in the literature is the electrical impedance. These points seem to have higher electrical conductance than their surrounding points. The stimulation of these points up to now is made not only mechanically and electrically but also optically (laser acupuncture). As far as we know, few references about optical properties of BAP's have been published in the scientific literature. We evaluated by optoacoustic technique, some skin points along the PC acupuncture meridian in the forearm region around PC5 and PC6. The measurements were performed each 0.5 cm from the wrist to complete 21 measurements (10 cm), using a Q switch NdYAG laser of 1064 nm wavelength, 5 Hz repetition rate, 9 ns pulse duration and below the security international limits for IR radiation for human tissues. The results were

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Automatic digital breast thermography segmentation for breast cancer detection

R. Guzmán-Cabrera ✉, A. González-Parada, J.R. Guzman-Sepulveda, M. Torres-Cisneros

Universidsad de Guanajuato, Ciudad Guanajuato, Guanajuato, Mexico

✉ guzmanc@ugto.mx

One in eight deaths worldwide is due to cancer. Cancer is the second leading cause of death in developed countries and the third leading cause of death in developing countries. In 2009, about 562,340 Americans died of cancer, more than 1,500 people a day. Approximately 1,479,350 new cancer cases were diagnosed in 2009. In the United Sates, cancer is the second most common cause of death, and accounts for nearly 1 of every 4 deaths [1]. The chance of developing invasive breast cancer at some time in a woman's life is about 1 in 8 (12%) [2]. Breast cancer continues to be a significant public health problem in the world. Approximately 182,000 new cases of breast cancer are diagnosed and 46,000 women die of breast cancer each year in the United States [3]. Thus, the incidence and mortality of breast cancer are very high, so much so that breast cancer is the second leading cause of cancer death in women. Although breast thermography has its limitations in sensitivity and specificity and it is dependent on examination conditions, it provides valuable information about the physiological condition of the breasts. Its ability to detect early physiological changes in breasts due to cancer formation can be used to detect patients whom require more thorough examinations, thus making the treatment more effective.

This paper presents an approach for detecting in digital thermography not only the detection and early stage of tumors can also detectable The first step of the cancer signs detection should be a segmentation procedure able to distinguish masses and micro calcifications from background tissue using Morphological operators and finally fuzzy c- means clustering (FCM) algorithm has been implemented for intensity – based segmentation. The implemented algorithm is absolutely capable to identify and subsequently isolate the area of interest taking into account the result of the texture ana-

lysis of the image. The proposed technique shows better results. The method was tested over several images of image databases taken from Digital Database for Screening Mammography (DDSM) for cancer research and diagnosis. Results allow us to see the effectiveness of the proposed method.

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Analysis of thermal imaging for the detection of failures in transmission lines

R. Guzmán-Cabrera ✉, A. González-Parada, J.R. Guzman-Sepulveda, M. Torres-Cisneros

Universidsad de Guanajuato, Ciudad Guanajuato, Guanajuato, Mexico

✉ guzmanc@ugto.mx

The infrared images show the temperature scale based on the previous calibration of the camera thus allowing measuring the temperature over several regions of the test terminal. Despite an accurate contactless temperature measurement can be achieved by a good calibration of the infrared camera, the proposed image processing is not based on this calibration but on the textures defined by the gray levels that naturally arise due to thermal effects. In order to orientate the analysis of the thermal effects to the region of interest (ROI), infrared images of the experimental setup where digitally processed by using segmentation and extraction algorithms based on texture and morphological image analysis [1-4].

These processes, through which the ROI (i.e. region where the partial discharges are induced) is discriminated from the entire environment, allow not only having a calibrated measure of the temperature over several regions of the experimental setup but also accurately extracting the physical location where the failure is occurring.

The results are very promising, as they allow us to identify a fault in a transmission line if you need to have it offline, ie keeping the energized line.

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