

Electro-Thermal Imaging of Breast Phantom: An Experimental Study

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Abstract : To increase the temperature contrast in thermal images, the characteristics of the electrical conductivity and thermal imaging modalities can be combined. In this experimental study, it is objected to observe whether the temperature contrast created by the tumor tissue can be improved just due to the current application within medical safety limits. Various thermal breast phantoms are developed to simulate the female breast tissue. In vitro experiments are implemented using a thermal infrared camera in a controlled manner. Since experiments are implemented in vitro, there is no metabolic heat generation and blood perfusion. Only the effects and results of the electrical stimulation are investigated. Experimental study is implemented with two-dimensional models. Temperature contrasts due to the tumor tissues are obtained. Cancerous tissue is determined using the difference and ratio of healthy and tumor images. 1 cm diameter single tumor tissue causes almost 40 °mC temperature contrast on the thermal-breast phantom. Electrode artifacts are reduced by taking the difference and ratio of background (healthy) and tumor images. Ratio of healthy and tumor images show that temperature contrast is increased by the current application.

Keywords : medical diagnostic imaging, breast phantom, active thermography, breast cancer detection

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