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ESTIMATION THE INTENSITY AND LOCATION OF A TUMOR USING SEQUENTIAL FUNCTION SPECIFICATION METHOD

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ABSTRACT

Breast cancer is the second most frequent cancer in the world. It is the most frequent among women. The most of equipment used for diagnosis of this disease are expensive, such as mammography, computerized tomography, ultrasound and magnetic resonance imaging. The aim of this work is the analysis of the heat transfer process in living tissues. The development of a new method to assist in the detection of breast tumors/problems using thermographic images is presented. The properties and parameters for the numerical simulation of the breast were defined based on literature. Then the direct problem to obtain the surface temperature of the breast was solved as using both a commercial software COMSOL and analytical method. These simulated surface temperatures were used as input parameters for the solution of the inverse problem with the specified sequential function method. The technique of the sequential method estimates the location and intensity of the tumor present in the breast (by testing all locations). After the sequential method, Pearson correlation coefficient of the estimated and simulated temperatures determines the most suitable location for the tumor and hence the intensity. The results show that when the method was used to estimate anomalies for a healthy body, no tumor was found. However, in a body with tumor, the precision in the estimation of the intensity was 99.8% and the location of the inclusion in the breast was determined accurately. Thus this technique has potential for applications in vitro experimental cases and with the possibility of application also in vivo since the analysis considers regions of low sensitivity, as in real cases.