ABSTRACT

Hyperthermia therapy, a promising approach for cancer treatment, involves elevating the temperature of tissue to induce cell damage or enhance the effects of radiation therapy or chemotherapy. This thesis presents a comprehensive study on the design and optimization of microstrip antennas for hyperthermia applications.

The primary objective of this research is to investigate the potential of microstrip antennas to efficiently deliver electromagnetic energy to specific regions within the body for localized hyperthermia treatment. The thesis begins by providing a detailed review of hyperthermia treatment techniques, the physics of electromagnetic wave propagation in biological tissues, and the various antenna design parameters relevant to this application.

A key focus of this work is the development of novel microstrip antenna designs tailored to the unique challenges of hyperthermia treatment. The research explores the impact of antenna geometry, frequency, and power levels on tissue SAR patterns within the target area. Theoretical modelling, simulation studies, and experimental validations are carried out to assess the antenna's performance in line of requirements for hyperthermia.

The findings presented in this thesis contribute to the ongoing efforts to enhance the efficacy of hyperthermia treatment while minimizing its potential risks. The research outcomes may have significant implications for the development of patch antennas and treatment protocols, potentially improving the quality of life and prognosis for cancer patients.