Journal of Thermal Biology
Volume 85, October 2019, 102421

Analytical estimations of temperature in a living tissue generated by laser irradiation using experimental data

Faris S. Alzahrani [a], Ibrahim A. Abbas [a, b]

Show more

https://doi.org/10.1016/j.jtherbio.2019.102421

Highlights

- The analytical solution of hyperbolic bio-heat equation is presented.
- The effects of tissue parameters on temperature distribution are investigated.
- The validation of the obtained results by using experimental data.
- The effects of thermal relaxation times on the thermal damages are studied.
- the analytical estimations are found to be very useful for a variety of bio-thermal studies.

Abstract:

This paper presents an analytical approach associated with Laplace transformation, experimental temperature data, and a sequential concept over time to obtain the thermal damage and the temperature in a living tissue due to laser irradiation. The analytical solutions in the Laplace domain are appreciably obtainable. The thermal damage to the tissue is completely assessed by the denatured protein range using the formulation of Arrhenius. Numerical outcomes for temperatures and the thermal damages are graphically introduced. Besides, the comparison between the numerical computations and the existing experimental study shows that a current mathematical model is an effective tool for evaluating the biological

heat transfer in biological tissues.

Previous Next

Keywords

Bioheat transfer; Living tissue; Thermal damage; Laplace transform

Recommended articles Citing articles (0)