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ABSTRACT

Heat transfer analysis in living biological tissues is of critical concern not only for fundamental understanding of the thermoregulation but also for different thermal treatment modalities. This paper theoretically investigates the thermal behavior in living biological tissues based on different phase-lagging based bioheat transfer models. Generalized dual-phase-lag bioheat model and dual-phase-lag bioheat model have been studied and compared with Pennes model. An approximate analytical solution of the present problem has been done by Finite element Chebyshev wavelet Galerkin method which uses Chebyshev wavelet as a basis function. Multi-resolution and multi-scale computational property of Chebyshev wavelet in the present case localizes small scale variations of solution and fast switching of functional bases. Larger differences in the temperature prediction at the hyperthermia position have been observed by different bioheat models. Also effect of variability of porosity, interfacial convective heat transfer and coupling factor has been shown graphically. The whole analysis is presented in dimensionless form. The authors have belief that present study will be more useful for medical doctors in the clinical field for better understanding of thermal data.