

Effect of Metabolic Heat Generation and Ambient Temperature on the Body Temperature - A Finite Element Study

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Abstract

This study focuses on investigating the effect of metabolic heat generation based on different activities, as well as ambient condition on the human body temperature. A three dimensional model of the human body was developed using COMSOL Multiphysics software. Also, the mesh was generated and finite element analysis was performed in the same platform. Penne's bio-heat equation was considered as the governing equation. Metabolic heat depends on the different activities people are involved in and body temperature changes accordingly with the changes of metabolic heat. Head and arm temperature were investigated with different metabolic heat generation and the ambient temperature. Both head and arm temperature were found sensitive with the ambient temperature. Metabolic heat has effect on the arm temperature and body minimum temperature. The outcome of this study might help estimate the body tissue temperature for different conditions.

Keywords

Bio-heat, Metabolic Heat Generation, COMSOL, Tissue Temperature

Biographies

Dr. A M M Mukaddes is a professor in the Department of Industrial and Production Engineering of Shahjalal University of Science and Technology (SUST), Sylhet, Bangladesh. He received his master of engineering in computational mechanics from kyushu University, Japan and doctor of engineering in computational mechanics from kyushu University, Japan. He was a postdoctoral fellow in Toyo University, Japan. He received B.Sc. Engineering from the mechanical engineering discipline. At present, his research is focused on system simulation, finite element analysis of engineering problems and information systems. During his academic carrier, he has published numerous international journals and conference papers.

Kanta Das Purkaysta is a graduate from the Department of Industrial and Production Engineering of Shahjalal University of Science and Technology (SUST), Sylhet, Bangladesh. Her research interests lie in finite element modeling, solid mechanics and biomechanics.