

Human Intraocular Thermal Field in Action with Different Boundary Conditions Considering Aqueous Humor and Vitreous Humor Fluid Flow

Authors : Dara Singh, Keikhosrow Firouzbakhsh, Mohammad Taghi Ahmadian

Abstract : In this study, a validated 3D finite volume model of human eye is developed to study the fluid flow and heat transfer in the human eye at steady state conditions. For this purpose, discretized bio-heat transfer equation coupled with Boussinesq equation is analyzed with different anatomical, environmental, and physiological conditions. It is demonstrated that the fluid circulation is formed as a result of thermal gradients in various regions of eye. It is also shown that posterior region of the human eye is less affected by the ambient conditions compared to the anterior segment which is sensitive to the ambient conditions and also to the way the gravitational field is defined compared to the geometry of the eye making the circulations and the thermal field complicated in transient states. The effect of variation in material and boundary conditions guides us to the conclusion that thermal field of a healthy and non-healthy eye can be distinguished via computer simulations.

Keywords : bio-heat, boussinesq, conduction, convection, eye

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