Numerical Thermal Analysis Of Human Eye Under LED Ray Illumination

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Abstract

This study investigates the temperature distribution in the human eye subjected to LED ray heating using a 2D numerical model. The model comprises various ocular tissues, including the cornea, aqueous humour (AH), ciliary body, trabecular meshwork (TM), lens, vitreous humour (VH), retina, choroid, and sclera. The eye dimensions, boundary conditions, and heat loads are consistent with previous studies. The Boussinesq flow approximation is applied to the AH domain, while Darcy's law is employed for the TM domain. The heat-transfer and Geometrical Optics (GOP) interfaces are utilized to calculate ray heating at varying distances. The steady-state model results show good agreement with existing numerical models in terms of corneal temperature and fluid velocity in the AH domain. The results also show temperature rise from LED rays. The findings of this study contribute to the understanding of thermal effects in the human eye under LED ray heating, providing valuable insights for different applications and development.

Reference

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Figures used in the abstract

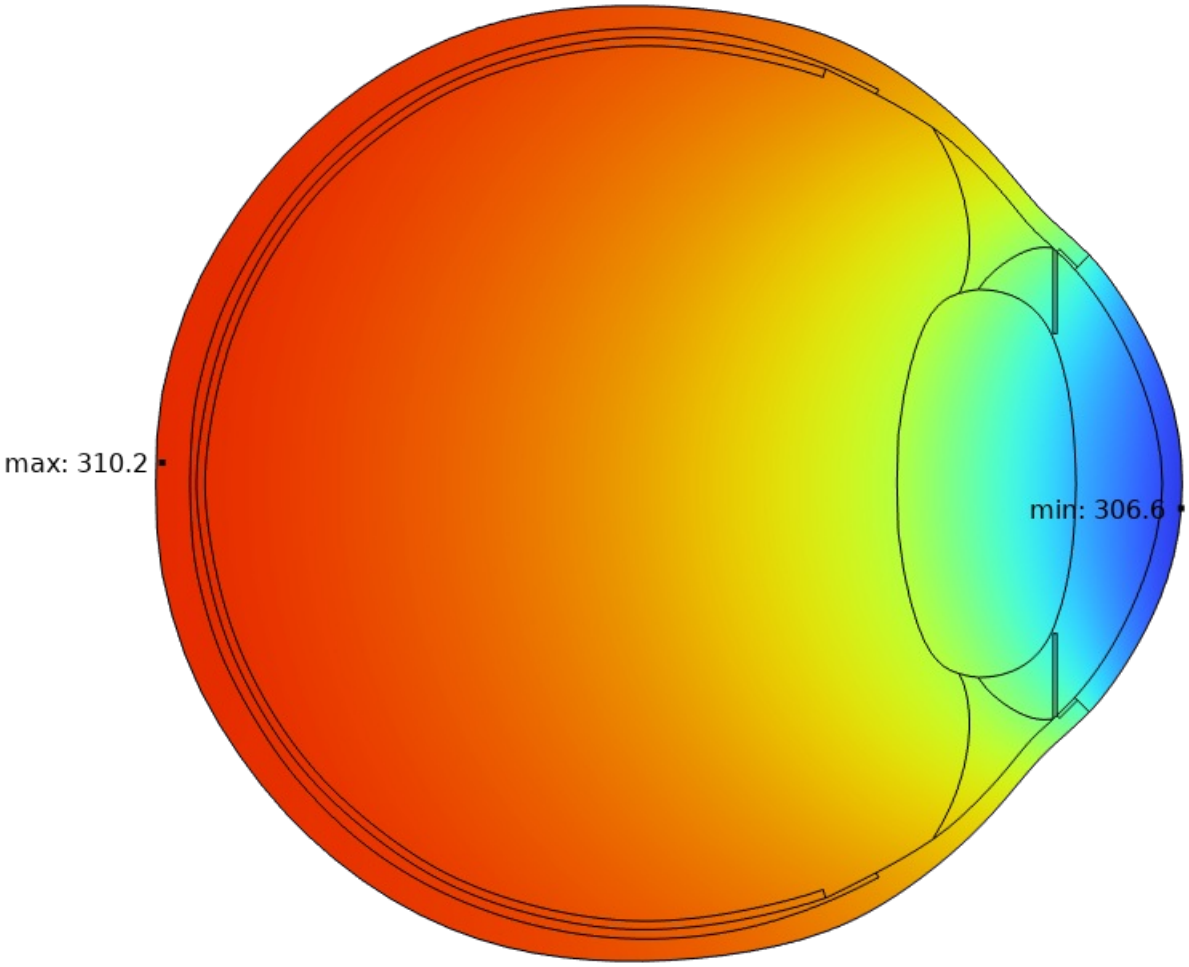

Figure 1 : Temperature Rise