

# Mathematicians model heat flow in human tears

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Mathematicians from the University of Delaware have created a new model of the fluid dynamics and heat flow in human tears. When people blink their eyes, a thin liquid film is spread across the surface of the eye.

Experiments show that the surface of the tear film cools slightly after each blink, and for dry eye patients the rate of cooling can be even higher. The Delaware researchers set out to create a [heat transfer](#) model with enough detail to capture this experimentally observed cooling.

Models that set a fixed temperature for the eyeball show the temperature of the tear film actually increasing slightly after each blink. A model that incorporates heat transfer into the eye through a thin layer likewise shows a [temperature increase](#) during the interblink period. But when the researchers incorporated heat transfer into a sufficiently thick region of tissue under the tear film, the model produced results comparable to the rate of cooling observed in vivo.

Future work by the team may touch on better ways to model the lipid component of tears and the temperature dynamics during the motion of a blinking eyelid.

**More information:** "A model for the human tear film with heating from within the eye" *Physics of Fluids*.

Provided by American Institute of Physics

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