

Abstract Submitted
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Tear film dynamics: modeling the glycocalyx as a porous medium¹ JAVED SIDDIQUE, Penn State York, ANTONIO MASTROBERARDINO, School of Science, Penn State Erie, RICHARD BRAUN, Department of Mathematical Science, University of Delaware, DANIEL ANDERSON, Department of Mathematical Science, George Mason University — The human tear film is a complex fluid structure composed of multiple layers: an aqueous layer that comprises most of the film and an outermost thinner lipid layer coat a forest of large transmembrane mucins at the epithelial surface. The glycocalyx helps provide stability to the ocular surface by assisting the tear film to wet it. It is also permeable to water, but less so to ions. We formulate a thin film model based on lubrication theory in order to understand the dynamics between the aqueous layer and the glycocalyx, which we treat as a rigid porous medium. We present numerical solutions for the evolution of the tear film and discuss the roles played by the key parameters of the system.

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