

Pharmacological Models and Numerical Algorithms for the Refinement of Therapeutic Approaches for Retinal Diseases

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Abstract

We are developing a Virtual Eye and in silico therapies for the treatment of retinal diseases like age-related macular degeneration. The underlying model consists of a pharmacological model for the drug, which we extend by including spatial resolution, coupled with models describing the physiology of the vitreous medium. The resulting model is a system of partial differential equations, convection-diffusion-reaction equations coupled with Darcy-, Navier-Stokes- or viscoelastic Burgers flow. We are performing long-term three-dimensional Finite Element simulations and with specific output functionals we can perform accurate and efficient treatment testing, calculate the optimal injection position, perform drug comparison, and quantify the effectiveness of the therapy.

