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Simulations of Keratoconus Patient Vision with Optical Eye Modeling BO TAN, YING-LING CHEN, J.W.L. LEWIS, LEI SHI, University of Tennessee Space Institute, Tullahoma, TN, MING WANG, Wang Vision Institute, Nashville, TN — Keratoconus (KC) is an eye condition that involves progressive corneal thinning. Pushed by the intraocular pressure, the weakened cornea bulges outward and creates an irregular surface shape. The result is degraded vision that is difficult to correct with regular eye glasses or contact lens. In this study we use the optical lens design software, ZeMax, and patient data including cornea topography and refraction prescription to construct KC eye models. The variation of KC "cone height" on the cornea is used to simulate KC progression. The consequent patients' night vision and Snellen letter chart vision at 20 feet are simulated using these anatomically accurate 3-dimensional models. 100 million rays are traced for each image simulation. Animated results illustrate the change of KC visual acuity with the progression of disease. This simulation technique provides a comprehensive tool for medical training and patient consultation/education.

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