Finite Element Analysis of Altered Lens Capsule Mechanics After Cataract Surgery-Caleb C. Berggren 2019

Cataract surgery is the most common surgical procedure in the United States and is currently the only treatment for correcting the blurred vision that results from cataracts.

This procedure requires cutting a permanent hole in the lens capsule and completely removing the underlying clouded lens fibers, which are exchanged for an intraocular lens (IOL) that is held in place by the remaining capsular bag. Current issues after surgery include the inability of IOLs to fully recover youthful accommodation, posterior capsule opacification (PCO) and...
capsule contraction. The latter two are thought to be a dysfunctional fibrotic response of the remnant lens epithelial cells (LECs) to the significant mechanical perturbation that occurs during cataract surgery. Although previous investigators have developed mechanical models of the lens fibers and surrounding lens capsule to study accommodation and the development of presbyopia, little work has been done to model the post-surgical lens capsule. Furthermore, most models have used homogeneous, linear, and isotropic material properties despite the capsule displaying heterogeneous, nonlinear, and anisotropic behavior. Herein, we have developed the first model of a post-surgical lens capsule with an implanted IOL. This is also the first fully 3-D model of the whole lens capsule with regionally-varying, nonlinear, and anisotropic material properties. We report significant changes from normalcy in the post-surgical lens capsule mechanical environment as a result of IOL implantation, supporting the hypothesis that altered lens capsule mechanics drives the long-term fibrotic LEC response after surgery. This model may also assist in the development of improved IOL designs that minimize PCO and capsule contraction and fully restore youthful accommodative ability after cataract surgery.
of other numerical methods, this book goes beyond the finite element method and covers hybrid techniques that combine the finite element method with the finite difference time-domain method, the method of moments, and the high-frequency asymptotic methods to efficiently deal with a variety of complex antenna problems. Complemented with numerous examples, this cutting-edge resource fully demonstrates the power and capabilities of the finite element analysis and its many practical applications.

Integrated Optomechanical Analysis-Keith B. Doyle 2002 This tutorial presents optomechanical modeling techniques to effectively design and analyze high-performance optical systems. It discusses thermal and structural modeling methods that use finite-element analysis to predict the integrity and performance of optical elements and optical support structures. Includes accompanying CD-ROM with examples.

Analysis of Optical Structures-Donald C. O'Shea 1991

Optical Engineering- 1994 Publishes papers reporting on research and development in optical science and engineering and the practical applications of known optical science, engineering, and technology.

Design, Analysis, and Testing of Figure Correcting Cells for Two 0.8-m Lenses-Bruce Bigelow 1992

Optomechanics and Dimensional Stability-Roger A. Paquin 1991

International Encyclopedia of Composites-Stuart M. Lee 1990 Includes almost all essential areas necessary to understand this group of materials in detail, and how to use them for different applications. Includes special types of composites used as engineering materials, the behavior of composite materials under different types of loading conditions, composites with special property profiles, and design aspects of composites materials.


Optomechanical and Precision Instrument Design-Society of Photo-optical Instrumentation Engineers 1995

Current Developments in Lens Design and
Optical Engineering VIII-Pantazis Mouroulis 2007 Proceedings of SPIE present the original research papers presented at SPIE conferences and other high-quality conferences in the broad-ranging fields of optics and photonics. These books provide prompt access to the latest innovations in research and technology in their respective fields. Proceedings of SPIE are among the most cited references in patent literature.

Structural Mechanics of Optical Systems-Lester M. Cohen 1984

5th International Workshop on Adaptive Optics for Industry and Medicine-Wenhan Jiang 2005

Proceedings of SPIE present the original research papers presented at SPIE conferences and other high-quality conferences in the broad-ranging fields of optics and photonics. These books provide prompt access to the latest innovations in research and technology in their respective fields. Proceedings of SPIE are among the most cited references in patent literature.

The Mechanical Design of HIRES-Jack Osborne 1993


Orthokeratology-John Mountford 2004 This unique resource demystifies the subject of orthokeratology and provides practical information for all those interested in the technique. Critical, balanced, and informative, it thoroughly evaluates the literature and evidence, gives sensible guidelines for practice, and features an international approach. This text is modern, comprehensive, and contains a wealth of color illustrations. Features practical and comprehensive information on Orthokeratology that isn't available in other resources Provides an international approach to the subject Thoroughly evaluates all of the available literature and evidence Offers sensible guidelines for practice for anyone thinking of using OrthoK lenses Designed for those who wish to update their knowledge concerning Orthokeratology and who want a thorough, balanced view of the procedure Written by international experts in the field

Proceedings of Ophthalmic Technologies- 2006

Selected Papers on Zoom Lenses-Allen Mann 1993