

Contents

Preface	vii
Acknowledgements	ix
Introduction	1
Basic Anatomy and Physiology of Eye Movements	5
Basic Measurement Terms	7
Basic Control System Concepts	10
Eye Movement Measurement Techniques	15
Stimulus arrangement and typical experimental protocol	15
Accommodation measurement	15
<i>Static</i>	15
<i>Dynamic</i>	17
Dynamic vergence and saccadic eye movement measurement	18
Static Analysis Techniques	23
Accommodation System	23
Vergence System	35
Linear Analysis of Relationship Between AC and ACG	35
Nonlinear Analysis of AC/A Using the Phoria and Fixation	
Disparity Methods	39
Derivation of model equations	41
<i>Open-loop vergence</i>	41
<i>Closed-loop vergence</i>	43
Model simulations	46
Proximal Model	49
Sensitivity Analysis of Accommodation and	
Vergence Interactions	56

Dynamic Analysis Techniques	61
Main Sequence	61
Accommodation System — Root Locus Analysis	61
Vergence Dual-Mode Dynamic Model	63
Accommodative Dual-Mode Dynamic Characteristics	73
Adaptation Model of Accommodation and Vergence	76
Nearwork-Induced Transient Myopia (NITM) Model	81
Refractive Error Development Model	87
Background	87
Incremental retinal-defocus theory	89
<i>Corneal growth does not contribute to the emmetropization process after two years of age</i>	90
<i>Neuromodulators control sensitivity to changes in retinal-image contrast</i>	90
<i>The overall mechanism for regulating the rate of axial length growth</i>	91
Applications of the theory	92
<i>Lenses</i>	92
<i>Prolonged nearwork</i>	93
Basic retinal anatomy and physiology	96
Model of refractive error development	96
Saccade-Vergence Interactions Dynamic Model	102
Summary Remarks	110
References	113
Index	125