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Nota di contenuto	Adaptive Optics for Vision Science; Contents; FOREWORD; ACKNOWLEDGMENTS; CONTRIBUTORS; PART ONE INTRODUCTION; 1 Development of Adaptive Optics in Vision Science and Ophthalmology; 1.1 Brief History of Aberration Correction in the Human Eye; 1.1.1 Vision Correction; 1.1.2 Retinal Imaging; 1.2 Applications of Ocular Adaptive Optics; 1.2.1 Vision Correction; 1.2.2 Retinal Imaging; PART TWO WAVEFRONT MEASUREMENT AND CORRECTION; 2 Aberration Structure of the Human Eye; 2.1 Introduction; 2.2 Location of Monochromatic Aberrations Within the Eye 2.3 Temporal Properties of Aberrations: Accommodation and Aging2. 3.1 Effect of Accommodation on Aberrations and Their Correction; 2.3.2 Aging and Aberrations; 2.4 Chromatic Aberrations; 2.4.1

Longitudinal Chromatic Aberration; 2.4.2 Transverse Chromatic Aberration; 2.4.3 Interaction Between Monochromatic and Chromatic Aberrations; 2.5 Off-Axis Aberrations; 2.5.1 Peripheral Refraction; 2.5.2 Monochromatic and Chromatic Off-Axis Aberrations; 2.5.3 Monochromatic Image Quality and Correction of Off-Axis Aberrations; 2.6 Statistics of Aberrations in Normal Populations 2.7 Effects of Polarization and Scatter 2.7.1 Impact of Polarization on the Ocular Aberrations; 2.7.2 Intraocular Scatter; 3 Wavefront Sensing and Diagnostic Uses; 3.1 Wavefront Sensors for the Eye; 3.1.1 Spatially Resolved Refractometer; 3.1.2 Laser Ray Tracing; 3.1.3 Shack-Hartmann Wavefront Sensor; 3.2 Optimizing a Shack-Hartmann Wavefront Sensor; 3.2.1 Number of Lenslets Versus Number of Zernike Coefficients; 3.2.2 Trade-off Between Dynamic Range and Measurement Sensitivity; 3.2.3 Focal Length of the Lenslet Array 3.2.4 Increasing the Dynamic Range of a Wavefront Sensor Without Losing Measurement Sensitivity 3.3 Calibration of a Wavefront Sensor; 3.3.1 Reconstruction Algorithm; 3.3.2 System Aberrations; 3.4 Summary; 4 Wavefront Correctors for Vision Science; 4.1 Introduction; 4.2 Principal Components of an AO System; 4.3 Wavefront Correctors; 4.4 Wavefront Correctors Used in Vision Science; 4.4.1 Macroscopic Discrete Actuator Deformable Mirrors; 4.4.2 Liquid Crystal Spatial Light Modulators; 4.4.3 Bimorph Mirrors; 4.4.4 Microelectromechanical Systems 4.5 Performance Predictions for Various Types of Wavefront Correctors 4.5.1 Description of Two Large Populations; 4.5.2 Required Corrector Stroke; 4.5.3 Discrete Actuator Deformable Mirrors; 4.5.4 Piston-Only Segmented Mirrors; 4.5.5 Piston/Tip/Tilt Segmented Mirrors; 4.5.6 Membrane and Bimorph Mirrors; 4.6 Summary and Conclusion; 5 Control Algorithms; 5.1 Introduction; 5.2 Configuration of Lenslets and Actuators; 5.3 Influence Function Measurement; 5.4 Spatial Control Command of the Wavefront Corrector; 5.4.1 Control Matrix for the Direct Slope Algorithm; 5.4.2 Modal Wavefront Correction 5.4.3 Wave Aberration Generator

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#### Sommario/riassunto

Leading experts present the latest technology and applications in adaptive optics for vision science. Featuring contributions from the foremost researchers in the field, *Adaptive Optics for Vision Science* is the first book devoted entirely to providing the fundamentals of adaptive optics along with its practical applications in vision science. The material for this book stems from collaborations fostered by the Center for Adaptive Optics, a consortium of more than thirty universities, government laboratories, and corporations. Although the book is written primarily for research

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