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Zernike Interpretation in Ocular Photorefraction Images LEI SHI, YING-LING CHEN, KEVIN BAKER, J.W.L. LEWIS, BO TAN, University of Tennessee Space Institute, Tullahoma, TN, MING WANG, Wang Vision Insititute, Nashville, TN — Photorefraction (PR) is a common method used in public vision screening for near/far-sightedness and cross eyes. The eye is photographed with an illuminating source close to the camera. Diagnosis is given by the intensity distribution across the pupil reflex. In this study, an enhanced PR system is assembled and used to obtain monocular images from patients in Wang Vision Institute. Thirteen rapidly sequenced IR images are taken for each eye. A target-finding algorithm locates the pupil, and the scaled intensity distribution of the pupil is color-coded into 8 levels. The false-color maps show distinguished patterns between normal and abnormal eyes. Zernike analysis of the image provides quantitative measure of the 1^{st}, 2^{nd}, and high-order ocular aberrations. The results reveal that normal eyes are predominantly described by 1st order coefficients, while abnormal eyes exhibit a significant contribution from high-order terms. This study shows that PR can be extended to detect high-order aberration in addition to its traditional applications.

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