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(54) **RAPID, AUTOMATIC MEASUREMENT OF THE EYE'S WAVE ABERRATION**

(75) Inventors: **David R. Williams**, Fairport, NY (US); **William J. Vaughn**, Rochester, NY (US); **Benjamin D. Singer**, Pittsford, NY (US); **Heidi Hofer**, Rochester, NY (US); **Geun-Young Yoon**, Rochester, NY (US); **Pablo Artal**, Murcia (ES); **Juan Luis Aragón**, Murcia (ES); **Pedro Prieto**, Murcia (ES); **Fernando Vargas**, Murcia (ES)

(73) Assignee: **University of Rochester**, Rochester, NY (US)

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Primary Examiner—George Manuel
(74) *Attorney, Agent, or Firm*—Blank Rome LLP

(57) **ABSTRACT**

A wavefront aberration of an eye is determined, e.g., in real time. The eye is illuminated, and the light reflected from the retina is converted into spots with a device such as a Hartmann-Shack detector. The displacement of each spot from where it would be in the absence of aberration allows calculation of the aberration. Each spot is located by an iterative technique in which a corresponding centroid is located in a box drawn on the image data, a smaller box is defined around the centroid, the centroid is located in the smaller box, and so on. The wavefront aberration is calculated from the centroid locations by using a matrix in which unusable data can be eliminated simply by eliminating rows of the matrix. Aberrations for different pupil sizes are handled in data taken for a single pupil size by renormalization.

90 Claims, 11 Drawing Sheets