

Static telescope aberration measurement using lucky imaging techniques

Marcos López-Marrero · Luis Fernando
Rodríguez-Ramos · José Gil Marichal-Hernández ·
José Manuel Rodríguez-Ramos

Received: 15 September 2011 / Accepted: 9 February 2012 / Published online: 24 February 2012
© Springer Science+Business Media B.V. 2012

Abstract A procedure has been developed to compute static aberrations once the telescope PSF has been measured with the lucky imaging technique, using a nearby star close to the object of interest as the point source to probe the optical system. This PSF is iteratively turned into a phase map at the pupil using the Gerchberg–Saxton algorithm and then converted to the appropriate actuation information for a deformable mirror having low actuator number but large stroke capability. The main advantage of this procedure is related with the capability of correcting static aberration at the specific pointing direction and without the need of a wavefront sensor.

Keywords Static aberration · Lucky imaging · Phase retrieval · Gerchberg–Saxton

1 Introduction

Most present-day telescopes have been designed bearing in mind the seeing statistics as the reference for the error budget in static aberrations. It was

M. López-Marrero (✉) · J. G. Marichal-Hernández · J. M. Rodríguez-Ramos
University of La Laguna, La Laguna, Spain
e-mail: mlmarr@ull.es

J. G. Marichal-Hernández
e-mail: jmariher@ull.es

J. M. Rodríguez-Ramos
e-mail: jmramos@ull.es

L. F. Rodríguez-Ramos
Instituto de Astrofísica de Canarias, Tenerife, Canary Island, Spain
e-mail: lrr@iac.es