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Optics and photonics — Microlens arrays —

Part 2: Test methods for wavefront aberrations

Optique et photonique — Réseaux de microlentilles —

Partie 2: Méthodes d'essai pour les aberrations du front d'onde

Reference number
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Foreword

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This second edition cancels and replaces the first edition (ISO 14880-2:2006), which has been technically revised.

The main changes are as follows:

— text for Annex E was revised;

— Figure E.1 was replaced;

— references and numbering confirmed.

A list of all parts in the ISO 14880 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Examples of applications of microlens arrays include three-dimensional displays, coupling optics associated with arrayed optical radiation sources and photo-detectors, enhanced optics for liquid crystal displays, and optical parallel processor elements.

The market in microlens arrays has generated a need for agreement on basic terminology and test methods for defining microlens arrays. Standard terminology and clear definitions are needed not only to promote applications but also to encourage scientists and engineers to exchange ideas and new concepts based on common understanding.

Microlenses are used as single lenses and also in arrays of two or more lenses. The characteristics of the lenses are fundamentally evaluated with a single lens. Therefore, it is important that the basic characteristic of a single lens can be evaluated. However, if a large number of lenses is formed on a single substrate, the measurement of the whole array will incur a lot of time and cost. Furthermore, methods for measuring lens shapes are essential as a production tool.

Characteristic parameters are defined and examples of applications given in ISO 14880-1. It has been completed by a set of three other International Standards, i.e. ISO 14880-2, ISO 14880-3 and ISO 14880-4.

This document specifies methods for measuring wavefront quality. Wavefront quality is the basic performance characteristic of a microlens. Characteristics other than wavefront aberrations are specified in ISO 14880-3, ISO 14880-4 .

ISO/TR 14880-5 guides the user in selecting the appropriate measurement method from the ISO 14880 series of standards.

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Optics and photonics — Microlens arrays —

Part 2: Test methods for wavefront aberrations

1 Scope

This document specifies methods for testing wavefront aberrations for microlenses within microlens arrays. It is applicable to microlens arrays with very small lenses formed inside or on one or more surfaces of a common substrate.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14880-1, *Optics and photonics — Microlens arrays — Part 1: Vocabulary*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14880-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.2 Symbols and abbreviated terms

Table 1 lists associated symbols, abbreviated terms and units of measurement used in this document.

Table 1 — Symbols, abbreviated terms and units of measure

Symbol	Unit	Term
Φ	µm	wavefront aberration
$\Phi_{\text{P-V}}$	µm	peak-to-valley value of wavefront aberration
Φ_{rms}	µm	root-mean-square value of wavefront aberration
λ	µm	wavelength
θ	degree (°)	acceptance angle
NA	none	numerical aperture

NOTE The wavefront aberration, peak-to-valley values of wavefront aberration and root-mean-square values of wavefront aberration are often expressed in units of "λ" based on the results of interferometer measurements. Wavefront aberration is expressed in multiples of "λ" (wavelength (µm)) of the laser light source used in the interferometer.

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