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Optics and photonics — Microlens arrays —

Part 1:
Vocabulary and general properties

Optique et photonique — Réseaux de microlentilles —

Partie 1: Vocabulaire et propriétés générales

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Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 172, *Optics and photonics*, Subcommittee SC 9, *Electro-optical systems*.

This second edition cancels and replaces the first edition (ISO 14880-1:2001), which has been technically revised. It also incorporates the Technical Corrigenda ISO 14880-1:2001/Cor 1:2003 and ISO 14880-1:2001/Cor 2:2005.

ISO 14880 consists of the following parts, under the general title *Optics and photonics — Microlens arrays*:

— *Part 1: Vocabulary and general properties*

— *Part 2: Test methods for wavefront aberrations*

— *Part 3: Test methods for optical properties other than wavefront aberrations*

— *Part 4: Test methods for geometrical properties*

— *Part 5: Guidance on testing*

Introduction

The aim of this part of ISO 14880 is to clarify the terms used in the field of microlens arrays.

Microoptics and microlens arrays are found in many modern optical devices.[1] They are used as coupling optics for detector arrays, the digital camera being an example of a mass market application. They are used to enhance the optical performance of liquid crystal displays to couple arrays of light sources and to direct illumination for example in 2D and 3D television, mobile phone and portable computer displays. Microlens arrays are used in wavefront sensors for optical metrology and astronomy, lightfield sensors for three–dimensional photography and microscopy and in optical parallel processor elements.

Multiple arrays of microlenses can be assembled to form optical systems such as optical condensers, controlled diffusers and superlenses.[2][3] Furthermore, arrays of microoptical elements such as micro-prisms and micro-mirrors are used.[4][5]

The expanded market in microlens arrays has generated a need to agree on basic terms and definitions for microlens arrays and systems and this part of ISO 14880 aims to satisfy that need.

Optics and photonics — Microlens arrays —

Part 1:
Vocabulary and general properties

1 Scope

This part of ISO 14880 defines terms for microlens arrays. It applies to microlens arrays which consist of arrays of very small lenses formed inside or on one or more surfaces of a common substrate and systems. The aim of this part of ISO 14880 is to improve the compatibility and interchangeability of lens arrays from different suppliers and to enhance the development of technology using microlens arrays.

2 Terms and definitions

2.1 Basic definition of microlens and microlens array

2.1.1
microlens
lens in an array with an aperture of less than a few millimetres including lenses which work by refraction at the surface, refraction in the bulk of the substrate, diffraction or a combination of these

Note 1 to entry: The microlens can have a variety of aperture shapes: circular, hexagonal or rectangular for example. The surface of the lens can be flat, convex or concave.

2.1.2
microlens array
regular arrangement of microlenses on a single substrate

Note 1 to entry: Irregular or structured arrays are sometimes used, for example, in beam shaping, diffusion, and homogenization.

2.2 General terms and definitions

2.2.1
effective front focal length
$f_{E,f}$
distance from the vertex of the microlens to the position of the focus given by finding the maximum of the power density distribution when collimated radiation is incident from the back of the substrate

Note 1 to entry: The effective front focal length can differ from the paraxial front focal length in the case of aberrated lenses.

Note 2 to entry: The effective front focal length is different from the classical effective focal length since it is measured from the lens vertex.

2.2.2
effective back focal length
$f_{E,b}$
distance from the back surface of the substrate or the vertex of the microlens to the position of the focal point, when collimated radiation is incident from the lens side of the substrate

Note 1 to entry: The effective back focal length can differ from the paraxial back focal length in the case of aberrated lenses.