

CIE activities relevant to CCPR activities

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Foreword

At the 16th CCPR meeting in 2001, some members asked for having a written report on the CIE activities relevant to the CCPR activities before the meeting. This document intends to give a response to that demand. It covers the years 2001, 2002 and the beginning of 2003 and it does not pretend to be exhaustive. Many members of the CCPR are also members of the CIE, their comments are welcomed.

Introduction

The CIE is a technical, scientific and cultural non-profit organisation whose objective is to study and promote all aspects of light and lighting. It is important to note that in this objective light and lighting embraces such fundamental subjects as vision, photometry and colorimetry, involving natural and man-made radiation over the UV, the visible and IR regions of the spectrum, and application subjects covering all usage of light, indoors and out, including environmental and aesthetic effects, as well as means for the production and control of light and radiation.

The technical work is carried out by seven divisions. Each of them has been assigned a major subject of interest to the CIE.

- Division 1 : Vision and Colour
- Division 2 : Measurement of Light and Radiation
- Division 3 : Interior Environment and Lighting Design
- Division 4 : Lighting and Signalling for Transport
- Division 5 : Exterior Lighting and Other Applications
- Division 6 : Photobiology and Photochemistry
- Division 8 : Image Technology

The activities which are of major interest for the CCPR are carried out mainly in Division 2 because they are directly connected to light and radiation measurement. But some works done in division 1 and division 6 on fundamental aspects of vision, colour and photobiology could be relevant for the CCPR working programme.

Major fields of CIE activity related to CCPR

In order to give a brief overview of the CIE activities, the work of the various technical committees in the divisions have been brought together by topics. But some technical committees have terms of reference which can overlap several topics also they could be taken into account several times in different topics for different aspects of their activities. Moreover some technical committees have been put in a specific topic but they could also be put in an other topic due to the possible overlap of topics.

In this section of the report the topics are classified by decreasing importance according to the number of technical committees working on the subject. A list of technical committees

related, according to my opinion, to the CCPR activity is given at the end of this report. This list may not be comprehensive.

Photometry

The most important work in this field is carried out by technical committees within division 1 (6 technical committees) and is related to visual photometry. It deals with luminous efficiency functions in various conditions of observation, supplementary system of photometry and standard photometric 10° observer. At present time, these activities are devoted to a better knowledge of the visual system and are not intended to be used in physical photometry.

There is also activities in physical photometry within division 2 (4 technical committees). These activities are related first to the measurement of photometric quantities for specific sources : LEDs and flashing lights, and second to the use of detectors as transfer standards for photometry.

Related to flashing lights, the CIE has also organised a symposium on temporal and spatial aspects of light and colour perception and measurement in August 2002 at Veszprém (Hungary).

Action spectra

This activity which is in the field of division 6 is less directly connected with the CCPR traditional activities. Nevertheless, in my opinion, it is important because it is related to measurement of interaction of optical radiation with a biological organ in the same way that photometry is the measurement of interaction of light with eye. At present time there are 6 technical committees working on the best way for obtaining action spectra, on the standardisation of action spectra for plants, immediate pigmentation darkening, hyperbilirubinemia and UV disinfection.

Photobiological measurement

This activity is also in the field of division 6 and is related to methods for measuring photobiological responses in various conditions of use. There are 5 technical committees working on the mean effects of the solar radiation for several photobiological effects, the personal dosimetry for UV radiation and the disinfection of air and water. This last topic, disinfection of air and water, is knowing an increasing interest to try to avoid or at least reduce the propagation of epidemic.

Most of the photobiological effects are induced by UV radiation that increase the need for good measurement in this specific range of optical radiation.

LED

The LEDs are knowing a very strong development in the field of signalling due to the large number of colour now available and it is expected to have also an increasing use in the field of lighting with white light LEDs. Three technical committees within division 2 are working on photometric measurement of LED alone or grouped in arrays or clusters. Another within division 1 is working on the colour rendering of white LEDs.

As this subject is very important at present time, the CIE held a 2nd CIE expert symposium on LED measurement in May 2001 at Gaithersburg, Maryland (USA), titled “Standard methods for specifying and measuring LED and LED cluster characteristics”. The first one was in

October 1997 at Vienna, Austria, and was titled “Standard methods for specifying and measuring LED characteristics”.

Instrument characterisation

Four technical committees within division 2 are working on the methods and measuring techniques for characterising instrument used in photometric, colorimetric and radiometric measurements. The devices under consideration at present time are tristimulus colorimeters, spectrophotometers for measuring transmittance and reflectance, illuminance meters, luminance meters and UV radiometers.

Colorimetry

There are only two technical committees within division 1 working directly in the field of fundamental colorimetry but they are doing a very important work since one is revising an updating the well known CIE publication 15.2 “Colorimetry” which contains all the bases of the present system of colorimetry and the other is working on the improvement of matching colour functions. Beside these two technical committees it exists several others technical committees in division 1 and one in division 2 working on applied colorimetry for industrial purposes. A relatively new subject of interest for the CIE in colorimetry is the measurement of the colour of effect materials.

Optical properties of materials

The topics in this field covered by the CIE at present time are the calibration methods and photoluminescent standard for total radiance factor measurement and the measurement of the spectral coefficient of retroreflection. The two technical committees dealing with these subjects are within division 2.

Detectors

The activity of the CIE in this field is also rather low since there is only two technical committees within division 2 working on the characterisation of detectors. One is dealing with linearity measurement and the other with spectral responsivity measurements.

General aspects

There is within division 2, two technical committees dealing with the general aspects of light and radiation measurement and which are working in the fields of interest of the CCPR. The first is working on the determination of the measurement uncertainty in photometry and the second is working on vocabulary matters.

The CIE has organised an expert symposium in January 2001, at Vienna, Austria on “Uncertainty evaluation - Method for analysis of uncertainties in optical radiation measurement”

Publications

During the period from January 2001 up to now the CIE has published a large number of documents. This list given below reports only the publications related to the CCPR activities.

- CIE Standard S 009.2002, Photobiological safety of lamps and lamp systems.
- CIE Draft standard DS 010.3-2002, Photometry-The CIE system of physical photometry.
- CIE Draft standard DS 012.2-2002, Standard method of assessing the spectral quality of daylight simulators for visual appraisal and measurement of colour.
- CIE Draft standard DS 013.2-2002, International standard global UV index.
- 141-2001, Spectral weighting of solar ultraviolet radiation.
- 148-2002, Action spectroscopy of skin with tuneable lasers.
- 149-2002, The use of tungsten filament lamps as secondary standard sources.
- 151-2003, Spectral weighting of solar ultraviolet radiation.
- X020-2001, Proceedings of the CIE expert symposium 2001 “Uncertainty evaluation - Method for analysis of uncertainties in optical radiation measurement”
- X022-2001, Proceedings of the 2nd CIE expert symposium on LED measurement “Standard methods for specifying and measuring LED and LED cluster characteristics”.
- X025-2003, Proceedings of the CIE symposium '02 on temporal and spatial aspects of light and colour perception and measurement. August 2002.

Technical Committees

Division 2 – Measurement of light and radiation

Terms of reference : To study standard procedures for the evaluation of ultraviolet, visible and infrared radiation, global radiation and optical properties of materials and luminaries as well as the optical properties and performance of physical detectors and other devices required for their evaluation.

- **TC 2-16 :** Characterisation of the performance of tristimulus colorimeters (Maria Luisa Rastello)
- **TC 2-19 :** Measurement of the spectral coefficient of retroreflection (Norbert Johnson)
- **TC 2-25 :** Calibration methods and photoluminescent standard for total radiance factor measurement (Joanne C. Zwinkels)
- **TC 2-28 :** Methods of characterising spectrophotometers (Peter Clarke)
- **TC 2-29 :** Measurement of detector linearity (Tom Larason)
- **TC 2-37 :** Photometry using detectors as transfer standards (Yoshi Ohno)
- **TC 2-40 :** Characterising the performance of illuminance and luminance meters (Reiner Rattunde)
- **TC 2-43 :** Determination of the measurement uncertainty in photometry (Georg Sauter)

- TC 2-44 : Vocabulary matters (John R. Moore)
- TC 2-45 : Measurement of LEDs – Revision of the CIE 127 (Kathleen Muray)
- TC 2-46 : CIE/ISO standards on LED intensity measurements (John Scarangelo)
- TC 2-47 : Characterisation and calibration methods of UV radiometers (Gan Xu)
- TC 2-48 : Spectral responsivity measurement of detectors, radiometers and photometers (George Eppeldauer)
- TC 2-49 : Photometry of flashing light (Yoshi Ohno)
- TC 2-50 : Measurement of the optical properties of LED clusters and arrays (Gerog Sauter)
- TC 2-53 : Multigeometry colour measurement of effect materials (Gerhard Rössler)

Division 1 – Vision and colour

Terms of reference : To study visual responses to light and to establish standards of response functions, models and procedures of specification relevant to photometry, colorimetry, colour rendering, visual performance and visual assessment of light and lighting.

- TC 1-21 : Testing of supplementary systems of photometry (Ken Sagawa)
- TC 1-30 : Luminous efficiency functions (Mitsuo Ikeda)
- TC 1-37 : Supplementary system of photometry (Ken Sagawa)
- TC 1-41 : Extension of $V_M(\lambda)$ beyond 830 nm (Pieter L. Walraven)
- TC 1-46 : Concept and application of equivalent luminance (Yasuhisa Nakano)
- TC 1-48 : Revision of CIE document 15.2 – Colorimetry (Janos D. Schanda)
- TC 1-56 : Improved matching colour functions (M. H. Brill)
- TC 1-59 : Standard photometric 10° observer (Janos D. Schanda)
- TC 1-62 : Colour rendering of white LED light sources (Peter Bodrogi)

Division 6 – Photobiology and photochemistry

Terms of reference : To study and evaluate the effects of optical radiation on biological and photochemical systems (exclusive of vision).

- TC 6-08 : Guidelines for obtaining action spectra (Dieter Kockott)

- **TC 6-23** : Develop generalised action spectra for plant responses to wavebands from 280 to 1100 nm (Donald T. Krizek)
- **TC 6-25** : The conventional solar day weighted by UV action spectra (Stephen Wengraitis)
- **TC 6-31** : Immediate pigmentation darkening (J. P. Césarini)
- **TC 6-35** : Present state of UV disinfection (Richard L. Vincent)
- **TC 6-43** : UV water disinfection (Viney Jain)
- **TC 6-44** : Illuminator for treatment of infant hyperbilirubinemia (Myron L. Wolbarsht)
- **TC 6-46** : Standardised action spectrum for UV disinfection (Edward Nardell)
- **TC 6-51** : Determination and measurement of passive UV air disinfection (Richard L. Vincent)
- **TC 6-53** : Personal dosimetry for UV radiation (Starting TC)

For more information visit the web site : www.cie.co.at

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