dfwg

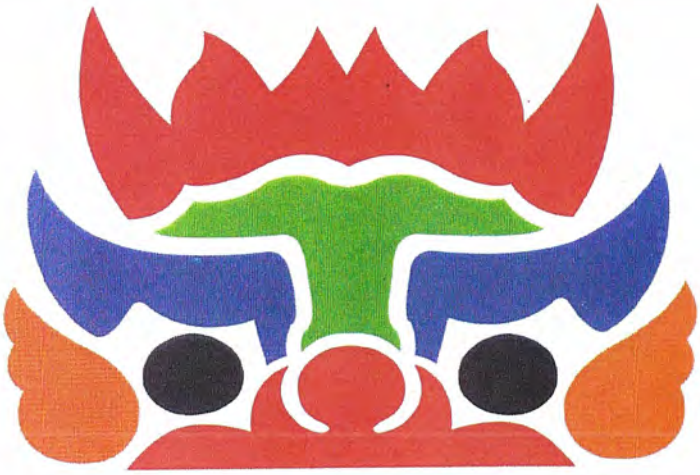
Report

1/00

Deutsche farbwissenschaftliche Gesellschaft e.V.

Herausgegeben vom Vorstand der DfwG

Verantwortlich: Prof. Dr. Heinz Terstiege



COLOR & ENVIRONMENT

Deutsche farbwissenschaftliche Gesellschaft e.V.
im Deutschen Verband Farbe

dfwg

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April 2000

Liebe Farbgemeinde,

das Jahr 2000 hat sich inzwischen ohne Computer-GAU eingespielt, auch das Schaltjahr (29. Februar) brachte für die Datenverarbeitung keine Schwierigkeiten. Der Computer-Alltag geht weiter, nur meiner hauchte seinen Geist aus, daher die Verspätung des Reports.

Bei der Redaktion sind weitere E-Mail Adressen von Mitgliedern eingetroffen. Mitglieder, die an einer internen elektronischen Korrespondenz interessiert sind, möchten mir ihre E-Mail Adressen bitte zuschicken.

Am 14. Januar ist unser langjähriges Vorstandsmitgliedglied Dr. Georg Geutler plötzlich und unerwartet verstorben. Dr. Geutler war Gründungsmitglied der DfwG und gehörte ihrem Vorstand seit der Gründung bis 1998 als Sekretär an. Nach dem Studium der Physik ging er ins Lichtmesslabor der Fa. OSRAM, Berlin. Dort war entwickelte er u.a. die von Dresler vor dem Krieg begonnene Partialfilterung von Photoempfängern zur Perfektion. Und hat hierüber auch an der TU Berlin promoviert. Als die Firma Osram dann ihr Messlabor nach München verlegte, wechselte er als Oberingenieur zum Institut für Lichttechnik der Technischen Universität Berlin. Hier war er der Joker für alles und Experte für farbmetrische, lichttechnische und strahlungsphysikalische Messgeräte. Manche Studien,- Diplom- oder Doktor-Arbeit war unter seiner gerätetechnischen Anleitung durchgeführt worden. Im Jahre 1974 war er Gründungsmitglied der Firma Lichtmesstechnik (LMT) in der er den Grundstock für die weltberühmten partialgefilterten $V(\lambda)$-Lichtmessempfänger oder $\bar{x}(\lambda)$-, $\bar{y}(\lambda)$-, $\bar{z}(\lambda)$-Frabmessempfänger war. Auf den internationalen AIC– und DfwG-Tagungen konnte man ihn stets antreffen und mit ihm diskutieren. Wir werden ihn in unserem Kreise sehr vermissen.

Im Herbst 99 wurde das 25 jährige Jubiläum des Normenausschuss Farbe (FNF) und das des Deutschen Nationalen Komitees der CIE (DNK) gefeiert. Eine Pressenotiz und der Vortrag des Vorsitzenden des FNF und des DNK über die "Anfänge farbmetrischer Normung in den zwanziger Jahren" werden im Report 2/00 wiedergegeben werden. Auf dieser Tagung wurde auch unserem Vizepräsidenten der DfwG, Herrn Dr. Gerhard Rösler der Manfred-Richter Preis, die goldene FNF-Nadel überreicht. Bericht auch im Report 2/00.

Internet-Informationen über die Division 1 (Sehen und Farbe) lagen seit 1997 auf dem Eis. Jetzt hat sich Dr. Nakano als neuer D1-Sekretär der Webseite angenommen und sie im März 2000 auf den neuesten Stand gebracht. Damit kann im Report 2/00 wieder ausführlicher über die Division 1 berichtet werden.

In der CIE Division 1 – Vision and Colour steht ein Technischer Bericht " The Correlation of Models for Vision and Visual Perfomance" zur Abstimmung. Der Bericht ist unter dem Obmann Prof. Werner Adrian vom Technischen Komitee 1-19 "Specification of Visibility for Real Tasks" erstellt worden. Es berichtet über den derzeitigen Stand des Wissens und Erfahrung in dem behandelten Gebiet von Licht und Beleuchtung; es ist zur Verwendung durch CIE-Mitglieder und durch andere Interessierte bestimmt. Es sollte jedoch beachtet werden, dass das Dokument eine Empfehlung und keine Vorschrift ist. Die neuesten CIE-Tagungsberichte oder die CIE NEWS sollten im Hinblick auf mögliche Änderungen zu Rate gezogen werden. Das Dokument ist sehr umfangreich und kann bei mir eingesehen oder als Fax auch bei unserem Mitglied und deutschem Vertreter der CIE Division 1, Herrn Dr. Klaus Witt bestellt werden. Ein Inhaltsverzeichnis in Englisch ist unter der Rubrik CIE angegeben. Kommentare bitte dann bis Anfang Juni an Dr. Witt.

Inzwischen liegen die Proceedings des AIC Midterm Meeting (22./23. 06. 1999 in Warschau) vor. Bezugsquelle: "Central Office of Measures, Optical Radiation Laboratory, Elektoralna 2, 00-139 Warschau, Polen". Vom NIST ist das Handbuch 152 "Recommended Practice; Symbols, Terms, Units and Uncertainty Analysis for Radiometric Sensor Calibration" veröffentlicht worden, zu beziehen vom U.S. Department of Commerce, National Institute for Standards and Technology, Gaitersburg, MD 20899-001, USA. Eine Broschüre für den Europäischen Service zur Kalibrierung Optischer Strahlung ist vom NPL in Teddington herausgegeben worden. Kontaktadresse: Dr. Julie Taylor, Centre for Optical and Environmental Metrology, National Physical Laboratory, Queens Road, Teddington, Middlesex United Kingdom TW11 OLW (E-Mail: julie.taylor@npl.co.uk). Weiterhin liegen mir die Kurzfassungen der Vorträge der "7th International Conference on new Developments and Applications in Optical Radiometry" (25./27. 10. 1999 in Madrid) vor.

Unser Mitglied, Prof. Norbert Fieles Kahl stellt auf seinen Webseiten das Lehrsystem ColPhys kostenlos zur Verfügung. Weiterhin hält er auch dort Studienarbeiten auf diesem Gebiet zum kostenlosen herunterladen zur Verfügung. Die Adresse lautet: http://www-cadcam.fh-reutlingen.de, von dort muss man sich in das Kapitel Download einwählen.

Die diesjährige DfwG-Jahrestagung wird bei unserem Mitglied Prof. Dr.-Ing. Hans-Jochen Schmidt-Clausen im Fachgebiet Lichttechnik der TH Darmstadt am Freitag, den 20. Oktober 2000 stattfinden. Traditionsgemäß findet am Nachmittag vorher für Interessierte eine Institutsbesichtigung statt. Wir bitten um rege Vortragsmeldungen

Mit den besten Wünschen

Ihr Heinz Terstiege

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e-mail: heinz.terstiege@t-online.de

DfwG-Jahrestagung 2000

Termin:

20. Oktober 2000

Ort:

Technische Hochschule Darmstadt
Fachgebiet Lichttechnik
Hochschulstraße 4a

Themen- und Referenten - Vorschläge werden noch entgegengenommen.

Institutsbesichtigung am Nachmittag, den 19. Oktober

DfwG-Mitgliederentwicklung

Die DfwG begrüßt als neue Mitglieder:

Herrn Dipl.-Ing. Uwe Schröder, Velbert
Herrn Dr. Stephan Völker, Lippstadt
Fa. Interprint Rotationsdruck, Arnsberg

* * *

Geburtstage IV 99/I 00

50 Jahre

Herr Dr. Wolfgang Böhme	* 06.02.50
Herr Dipl.-Ing. Frank Schwöbel	* 20.02.50
Herr Dietmar Meisel	* 20.04.50
Herr Dr. Gerhard Rösler	* 17.05.50
Herr Werner Mieskes	* 10.06.50

60 Jahre

Frau Dr. Barbara Hammes	* 25.02.40
Herr Prof. Dr. Roman Liedl	* 07.04.40
Herr Georg Oswald	* 26.05.40
Herr Prof. Dr. Dietrich Gall	* 28.05.40
Herr Helmut Jansen	* 17.06.40
Herr Gerhard Pausch	* 27.06.40

65 Jahre

Herr Rolf Griesser	* 12.01.35
Herr Prof. Dipl.-Ing. Chr. A. Schade	* 26.01.35
Herr Prof. Dr. Siegfried Kokoschka	* 08.04.35
Herr Prof. Norbert Fieles-Kahl	* 19.05.35

70 Jahre

Herr Dr. Jürgen Weidemüller	* 19.04.30

* * *

Der farbige Umschlag wurde freundlicherweise von der Firma Optronik übernommen.Herzlichen Dank

COMMISSION INTERNATIONALE DE L'ÉCLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

DIVISION 2
ACTIVITY REPORT
1999

Division Officers

Direktor: Teresa Goodman

Beigeordnete Direktoren: Dr. Georg Sauter, Nobert Johnson, Guy Vandermeersch

Sekretär: Dr. Yoshi Ohno
Editor: John Moore

Derzeitige Technische Komitees

TC No.	TC	Vorsitz	AD
TC2-04	Secondary standard sources	John R. Moore	S
TC2-16	Characterisation of the performance of tristimulous colorimeters	Maria Luisa Rastello	S
TC2-17	Recommendation for the integrated irradiance and spectral distribution of simulated solar radiation	Dieter Kockott	J
TC2-19	Measurement of the spectral coefficient of retroreflection	Norbert Johnson	J
TC2-23	Photometry of street-lighting luminaires	Guy Vandermeersch	V
TC2-24	Users guide for the selection of illuminance and luminance meters	K. Ganesha	V
TC2-25	Calibration methods and photoluminescent standard for total radiance factor measurement	Joanne C. Zwinkels	J

TC2-28	Methods of characterising spectrophotometers	Peter Klarke	J
TC2-29	Measurement of detector linearity	Teresa M. Goodman	S
TC2-30	Diode array radiometry	James Palmer	J
TC2-32	Measuring retroreflectance of wet horizontal road markings	Neil A. Hodson	J
TC2-35	CIE Standard for V(λ) and V'(λ)	Klaus D. Mielenz	J
TC2-36	Retroreflection: Definition and measurement (Revision of CIE publication 54)	Justin Rennilson	J
TC2-37	Photometry using detectors as transfer standards	Yoshi Ohno	S
TC2-39	Geometric tolerances for colorimetry	Danny C. Rich	J
TC2-40	Characterising the performance of illuminance and luminance meters	Reiner Rattunde	S
TC2-42	Colorimetric Measurements for visual displays	Andrew R. Hanson	J
TC2-43	Determination of measurement uncertainties in photometry	Georg Sauter	S
TC2-44	Vocabulary Matters	John R. Moore	J
TC2-45	Measurement of LEDs - Revision of CIE 127	Kathleen Muray	S
TC2-46	CIE/ISO standards on LED intensity measurements	John Scarangello	S
TC2-47	Characterization and Calibration Methods of UV Radiometers	Gan Xu	S
TC2-48	Spectral responsivity measurement of detectors, radiometers, and photometers.	George Eppeldauer	S
TC2-49	Photometry of Flashing Light	Yoshi Ohno	V
TC2-50	Measurement of the optical properties of LED clusters and arrays	Georg Sauter	V
TC2-51	Calibration of diode-array spectrometers	Richard Austin	J

*TCs 2-35, 2-40, 2-46 are producing CIE/ISO standards.
*TC2-50 and 2-51 are new since 1999.

Reporterships

No.	Reporter Title	Reporter	AD
R2-05	Visual Gloss	Julie Taylor	J
R2-06	Standardization of Measuring Geometry for the Colorimetry of Metallic Coatings	Calvin McCamy	J
R2-18	OIML Matters	Georg Sauter	S
R2-19	Emergency Lighting Luminaires	Lou Bedocs	S
R2-21	Use of detectors as absolute transfer standards for spectroradiometry	Nigel P. Fox	V
R2-22	Implementation of SI Photometric Units	Rainer Köhler	S
R2-23	ISO/CIE Standards for the measurement of reflectance and transmittance	Danny Rich	J
R2-24	Classification of color measuring instruments	Yoshi Ohno	J
R2-25	Liaison with IALA	Ian Tutt	V

*R-23, 24, 25 are new since 1999.

Liaisons

Organization	Liaison Officer
CCPR - Consultative Committee of Photometry and Radiometry (CCPR is described in the BIPM Home Page)	Rainer Köhler
ISO TC6 Paper, board & pulps	Joanne Zwinkels
ISO TC 180/SC 1: Solar energy/Climate - Measurement and data	Dieter Kockott
IEC TC 34: Lamps and rel. equipm.	G. Vandermeersch
IEC TC100/PT61966 Audio, Video and Multimedia Systems and Equipment	Yoshi Ohno
IEC/ISO JTAG2: Joint Technical Advisory Group 2	Alan Robertson
Division 8	Yoshi Ohno

Closed functions

TC2-14 Measurement of Reflectance and Transmittance, Including Turbid Media
TC2-41 Industrial photometry.
R2-09 Cryogenic radiometer.
R2-17 Aviation Photometry
Liaison: ISO TC160 SC2 WG2 Glass in buildings, Light & energy transfer

MEETINGS

The 24th Session of the CIE

The 24th Session of the CIE was held from 24th to 26th June 1999, at Warsaw University of Technology, Warsaw, Poland. In Division 2, there were 2 presented papers, 9 presented posters, and 13 display posters. The papers were published in the Proceedings, 24th Session of CIE-Warsaw'99.

Workshop on Photometry of Flashing Lights

The Workshop took place on June 25, 1999, as part of the 24th Session of CIE. The workshop was jointly organized by Div. 2 (Y. Ohno) and Div. 1 (K. Sagawa) to discuss issues of human vision aspects as well as physical measurements of flashing-lights. It was held for two and a half hours with about 40 participants, having seven introductory talks, followed by open discussion for about 40 minutes. The final report of the workshop was published in the Proceedings II, 24th Session of CIE-Warsaw'99.

1999 Technical Committee Meetings

In conjunction with 24th Session of the CIE , the following ten technical committees met on June 28 and 29, 1999 at the same venue. The minutes of these TC meetings are to be distributed to the TC members by the TC chairpersons. Brief reports on these TCs are included in the Division 2 Meeting minutes below.

TC2-32 Measuring Retroreflectance of Wet Horizontal Road Markings (N. Hodson)
TC2-36 Retroreflection: Definition and Measurement (J. Rennilson)
TC2-39 Geometric Tolerances for Colorimetry (D. Rich)
TC2-40 Characterizing the Performance of Illuminance and Luminance Meters (R. Rattunde)
TC2-43 Determination of Measurement Uncertainties in Photometry (G. Sauter)
TC2-45 Measurement of LEDs - Revision of CIE 127 (K. Muray)
TC2-46 CIE/ISO standards on LED intensity measurements (J. Scarangello)
TC2-47 Characterization and Calibration Methods of UV Radiometers (G. Xu)
TC2-48 Spectral responsivity measurement of detectors, radiometers, and photometers (G. Eppeldauer)

Quadrennial Report

The Director presented the report. The terms of reference were first reviewed. During the last quadrennium, Div. 2 had 9 new TCs commenced and 8 TCs closed. Three TCs had chairmanship changed. Five reporterships were created and four closed. We held annual Division meetings, in 1995 in New Delhi, 1996 in Vienna, and 1997 in Durban where we had a joint meeting with Division 4. We had our last meeting in Boulder, USA in 1998. Division 2 produced four technical reports and one standard. TC2-22 finished their work, and the report is to be published

in the next CIE Collection. We maintain a number of liaisons with IEC, ISO, and also with CCPR. We now have 25 active TCs and five reporterships.

Our website has become the center for dissemination of information of the Division. Our website is the model for all other divisions in terms of structure and contents, as recommended by the Secretaries' meeting. The appearance of Divisions' page should have flavor of each division, and should not be standardized. The websites of the divisions are now hosted by various laboratories. Our web server is provided by CSIR, and remotely maintained by our Secretary in the U.S. with no problem. This saves cost for the Central Bureau and the arrangement is to continue in the next quadrennium. We will further develop the contents of our website to further facilitate Division's activities.

Progress of Technical Committees

TC2-04 Secondary standard sources
Chair: J. Moore (UK) AD: Goodman
TR: Produce a technical report on the selection and operation of stable secondary standard sources.
ST: Report given by the chairperson. The draft has now been done for TC ballot. If there is no objections, it will hopefully go to Division ballot within next few months. The document has a few photographs.

TC2-14 Measurement of Reflectance and Transmittance, Including Turbid Media
Chair: P. Polato (Italy) AD: Johnson
TR: Define the standard geometric conditions for the measurement of transmittance and reflectance.
ST: The document "Practical methods for the measurement of reflectance and transmittance" has been published as CIE 130. The task of this TC has been completed and the TC is closed.

TC2-16 Characterization of the performance of tristimulus colorimeters
Chair: M. L. Rastello (Italy) AD: Goodman
TR: To produce a report recommending methods for assessing the performance of tristimulus colorimeter heads for measuring chromaticity coordinates.
ST: Report given by the chairperson. The TC had several meetings in the past, but not this time because the chairperson preferred to circulate the draft to TC members only at this stage. However, some useful information has been obtained from the conference and meetings of TC2-40 and TC43 (both TC chairs are the members of TC2-16). Their contribution will be taken into account in the next draft. The chairperson plans to get comments by September, and hopes to have another revision in November, then if members agree, to have TC voting.

TC2-17 Recommendation for integrated irradiance and spectral distribution of simulated solar radiation
Chair: D. Kockott (Germany) AD: Goodman
TR: Revise and update CIE Publication No.20 (1972)
ST: Report given by the AD. 18 months or so ago, the chairman sent out the draft document (on solar simulators for testing purposes) to the whole Division. He got some responses but not very much. The chairman would still like to have more input from TC members or from those with an interest in this subject. AD Goodman requested that anybody who has comments on or interest in the document should contact the chairman by e-mail. Goodman will also contact the chairman to

ask him to send his draft to the Secretary so that the document can be posted at a hidden web-page for wider distribution.

TC2-19 Measurement of the Spectral Coefficient of Retroreflection
Chair: N. Johnson (USA) AD: Johnson
TR: Identify the critical measurement parameters, tolerances, and requirements for, and conduct an international intercomparison of, the spectral coefficient of retroreflection.
ST: Report given by the chairperson. The completion of the TC document is delayed due to a strong request for one more set of data to be included. The chairman expects to obtain the data shortly and finalize the analysis to prepare the final draft for TC voting this year.

TC2-23 Photometry of Street-Lighting Luminaires.
Chair: G. Vandermeersch (Belgium) AD: Vandermeersch
TR: Prepare a technical report on the photometry of street lighting luminaires.
ST: Report given by the chairman. This TC has not started its work yet because, the TC waited for the results of the intercomparison within Europe, which started in 1996 and finished just at the end of last year.
Soardo (Italy), the Pilot laboratory of the comparison, was requested to give a brief report on the status of the intercomparison. The project for intercomparison of luminaires started three years ago with the support of the European Commission. Two types of luminaires were used, one with 260 W HPS and another with fluorescent tubes. The intercomparison measurements have finished. Provisional results are available. There are no problems in measurement compatibility. There are problems in measurement of street lighting luminaries, due to aiming difficulties. There are large differences in luminous intensity distribution. A meeting was held with the 12 participants. The draft paper is to be distributed by end of the year and then the paper is to be published. Vandermeersch added that the participants of this intercomparison to be the initial TC members, but it was planed to try to attract members from countries other than Europe as well. Anybody interested in this TC should contact the chairman.

TC2-24 Users guide for the selection of illuminance and luminance meters
Chair: K. Ganesha (India) AD: Goodman
TR: Prepare a user's guide for the selection and use of illuminance and luminance meters.
ST: Report given by the AD. The chairman had some trouble with communication in the past, but he has now obtained his own e-mail address and hopes to be able to communicate better. He is awaiting responses to his letter of June 1998 sent to TC members. Response so far has been disappointing. AD Goodman encourages the attendees and TC members to contact the TC chairman to provide him with more input, in order to get the committee work in progress and to produce this important document. Contact by email will be the most rapid way forward. The chairman's new mail: research74@mantraonline.com

TC2-25 Calibration Methods and Photoluminescent Standard for Total Radiance Factor Measurement
Chair: J. Zwinkels (Canada) AD: Johnson
TR: Prepare a CIE report on methods for measurement of total radiance factors of photoluminescent materials. Recommendations for realizing and calibrating photoluminescent standards by the one and two-monochromator method will be included.
ST: Written report submitted. The TC met May 6, 1999 in Vancouver, B.C. in conjunction with the Inter-Society Color Council meeting. Five TC members and 2 observers were in attendance. The eighth draft of the TC report was distributed and discussed. Figures have been added and

equation, table and figure numbering have been edited to conform with CIE guidelines. Remaining action items are some minor revisions to the text and to re-group the references at the end of the document. The revised document (ninth draft) will be circulated for TC ballot.

TC2-28 Methods of characterizing spectrophotometers
Chair: J. Verrill/ P. Clarke(UK) AD: Goodman
TR: Write a CIE report on the characterization of spectrophotometers by means of reference materials and other methods, with particular reference to linearity, wavelength error, stray light, and integrating sphere errors.
ST: Report given by AD. The progress has been delayed slightly due to poor health of the chairman. The 4th draft is nearing completion and will be circulated within the next few months. If there are no major changes, the 5th draft will be circulated for TC ballot in the autumn this year. The chairman is retiring from NPL in June 1999, and has appointed a TC Secretary, Peter Clarke (NPL, UK) to assist him in incorporating comments from the last draft, and all the figures and references have now been added. Contact to the TC chairman can be made via email: peter.clarke@npl.co.uk.

TC2-29 Measurement of detector linearity
Chair: T. Goodman (UK) AD: Goodman
TR: Prepare a CIE guide on methods for the characterization of the linearity of detectors of optical radiation, including different principles by which the linearity of detectors can be determined and causes of non-linear behavior, to aid users of optical radiation detectors in the selection and use suitable devices for specific applications.
ST: Report given by the chairperson. Progress has been slow during the past year, due to a reorganization of the chairman's responsibilities. However, this is now resolved and work on the third draft is now well underway. The third draft should be sent to TC members within the next few months.

TC2-30 Array Radiometry
Chair: Jim Palmer (USA) AD: Johnson
TR: Prepare an annotated bibliography for the CIE journal on diode array radiometry. Make appropriate recommendations for future work in diode array radiometry.
ST: Report given by the AD. The chairmanship has changed to Jim Palmer (Univ. Arizona, USA) after the Boulder meeting. The previous chairman, P. Wychorski, sent the TC documents and materials to the new chairman just recently. The new chairman is to start the work to finish the document and publish it in a CIE Collection.

TC2-32 Measuring Retroreflectance of Wet Horizontal Road Markings
Chair: N. Hodson (USA) AD: Johnson
TR: To prepare a guide for the methods of measuring coefficient of retroreflected luminance (specific luminance) of horizontal road markings under wet weather conditions.
ST: Report given by the chairman. This TC was re-started a year ago in Boulder with the new chairman. The TC had the second meeting on Monday 28th June in Warsaw. The TC agreed on a rough draft with outlines of chapters and sections. There were active discussions on a lot of issues, which have become a good input for the next draft. The TC plans to do annual testing, later this year or spring next year, to do actual measurements on wet pavement markings. Some TC members volunteered to update several sections of draft.

TC2-35 CIE Standard for V(λ) and V'(λ)
Chair: K. Mielenz (USA) AD: Johnson
TR: To prepare a new CIE Standard on the present V(l) and V'(l) functions.
ST: As covered in the Editor's report, the TC document "Photometry - The CIE System of Physical Photometry" has been edited by the Editor, and is now ready for Division ballot.
Discussion:
Sauter, one of the active members of the TC, was requested to give additional information. Comments were made on the document a few years ago regarding the relationship between CIE and CIPM. The problem is now solved with the revised document, and he believes the document is now ready for publication. Ohno mentioned that there have been a few revisions of the document by the chairman and by the Editor, and now it is complete and ready for Division ballot. Division Editor commented that he discussed with the chairman about the need for another TC ballot and they felt that, as a number of people already commented and much time spent on revising the draft, there would be no need for another ballot. The Editor Moore agrees the chairman's proposal to go now directly to Division ballot. Robertson suggested that, since the document went through many changes between a few persons, the document should be sent to TC members for information before ballot. Moore will relay this opinion to the chairman. Hengstberger asked about the change of the title of the document. Moore answered that the title of document does not have to be the same as the title of the TC; it has been decided by the TC to have this title rather than that of the TC; the title is extremely important for standards because a summary (normally comes in three languages for technical reports) does not accompany standards.

TC2-36 Retroreflection: Definition and Measurement (Revision of CIE Publication 54, Liaison with CEN/226)
Chair: J. Rennilson (USA) AD: Johnson
TR: To revise and update publication 54. To standardize test methods and measurement geometry for measuring the photometric and colorimetric properties of all types of retroreflectors under both day and nighttime conditions. To prepare this CIE document in ISO format to be issued as a joint CIE/ISO standard.
ST: Report given by the chairman. The TC has made much progress and is nearing completion. The TC just sent out the 12th draft for TC ballot. Two ballots were received back with comments and one negative vote. The TC met again this time in Warsaw and resolve these comments. New wording is to be added in the draft. The draft has also been edited by the Editor with many comments. A bibliography will be worked on and completed within one month. Next draft to be sent for Division ballot around August. The TC has agreed in the committee level that this committee is not to produce ISO/CIE standard. It is probable that a new committee will be proposed to produce standards based on this document.
Hengstberger added that this TC is listed on the website as one of the TCs producing CIE standards. This is now not the case, so the website will need to be corrected.

TC2-37 Photometry Using Detectors as Transfer Standards
Chair: Y. Ohno (USA) AD: Johnson
TR: To prepare a report on the properties of V(l)-corrected detectors that are suitable for disseminating and maintaining photometric units. This report will include methods for the use of these detectors.
ST: Report given by the chairman. The last meeting was in Boulder, and now the draft is close to completion. Apology was expressed for the little progress on this TC this time, due to the chairman giving priority to the work of his other committee (TC2-49). The draft will only need

changes of wording of several terms to give clearer definitions. This will be done in the next few months and the next draft is expected to be circulated for a TC ballot.
Director Hengstberger mentioned the chairman's heavy workload as the Secretary of the Division, chair of two TCs, and also organizer of the workshop on Photometry of Flashing Lights this time.

TC2-39 Geometric Tolerances for Colorimetry
Chair: D. Rich (USA) AD: Johnson
TR: Compile a technical report and recommendations specifying the geometric tolerances for the various geometries in colorimetry, including 0/45, 0/d and others. Parts of this technical report may be suitable for inclusion in a CIE standard specifying several geometric tolerance levels.
Working Program:
Utilize ISO 5/1 and ASTM E 1767 to develop a system of specifications for the geometry of color measurements. Define the specifications in the following order: Reflectance factor (t/8, d/8, d/0), radiance factor (45/0) and transmittance geometries (0/0, d/0). Specifications will be developed via computer simulation & verified experimentally.
ST: Written report submitted. The Committee met for the fifth time just prior to the CIE Division 2 meeting in Warsaw. Five committee members and six guests were present. In reviewing the terminology, it was agreed that the final report would have a separate section on terminology. The action items shown in the 1998 Activity Report had not been fulfilled due to the change of the chairman's affiliations and also to no actions by other members. After discussion on the current draft, the TC agreed on changes on five points. During the next few months, the chairman will prepare a second draft of the final report and distribute the draft to committee members for comment. The next draft will be written and distributed by 15 December 1999. The committee desires to hold the next meeting in conjunction with the ASTM B-12 Color and Appearance meeting, to be held in Toronto, Canada in June of 2000. The TC will not be meeting during the Division meetings at NPL in April 2000.

TC2-40 Characterizing the Performance of Illuminance and Luminance Meters
Chair: R. Rattunde (Germany) AD: Goodman
TR: Convert the present CIE Technical Report No. 69 into an ISO/IEC standard. Prepare a combined CIE/ISO standard describing the definitions of quantities influencing the performance of illuminance and luminance meters, as well as defining measurement procedures for the individual error quantities.
ST: Report given by the chairman. The TC had its 4th meeting on June 28th in Warsaw with 26 attendants. 9 of the 16 members had been present. The chairman presented the 3rd draft of the document which included some of the comments of the last meeting in Boulder 1998. No further written comments had been received by the chairman from the members since then. The TC discussed the general contents of the document and finally made a decision on the further treatment of the document. According to this, the chairman will submit a ballot per e-mail to the members and ask for opinions whether to modify the title, introduction chapter, or scope of the document together with text proposals within the next 2 months. (The draft will be posted at a hidden website by the Secretary.) The chairman will add the modifications according to the majority opinions into the draft and submit it to the Associate Director for further processing by the CIE. Next meeting will be held in conjunction with CIE D2 in spring 2000, at NPL, London, UK if necessary.

TC2-41 Industrial Photometry in Developing Countries
Chair: B. Bhattacharya (India) AD: Goodman
TR: To prepare a Technical Report giving guidance on recommended practices for photometric measurement (including sphere photometry and goniophotometry), taking account of the special requirements of industrial laboratories in developing countries.
ST: Report given by the AD. There has been no substantial activity since the establishment of the TC in 1995, and we have no contact from the chairman for the last two years regarding the work of this TC. Thus it is suggested that this TC be resolved unless we have other proposals for solution. Later at the meeting, the Division agreed to close this TC.

TC2-42 Colorimetry of Visual Displays
Chair: A. Hanson (UK) AD: Goodman
TR: To produce a Technical Report summarizing recommended practice for the measurement of the colorimetric and spectroradiometric properties of visual displays.
ST: Report given by the AD. Progress has been slow during the past few years, due to changes in the chairman's responsibilities. However, important liaisons with other groups including IEC are being maintained and it is anticipated that a draft document should be available for TC comment shortly.
Discussion:
Moore asked how this TC relates to the work of Division 8. Director Hengstberger commented that, following discussions with D8 Director, it had been agreed that such matters as published in the earlier document (CIE 122), for example, should go to Division 8, but this TC should stay in Division 2. Ohno commented that he was at the last D8 meeting in Baltimore, and talked about this TC, and that there was good communication with D8. Rennilson suggested that the title of the TC be changed to make clear to the people of D8 that this TC is dealing with measurements. D2 agreed to add the word "measurement" in the title.

TC2-43 Determination of measurement uncertainties in photometry.
Chair: G. Sauter (Germany) AD: Goodman
TR: To prepare a CIE recommendation as basis for the determination of measurement uncertainties valid for selected quantities used in photometry.
ST: Report given by the chairman. The TC had its second meeting this time in Warsaw with 23 attendees. There was much discussion on the structure. The document now consists of two major parts: the first part is the summary of all the equations used for determination of uncertainties, the second part consists of several examples, from simple ones to difficult ones. The second part should give more explanation to assist technicians as well as scientists to understand calculation and definitions of the uncertainties. Further written comments are requested in the next two months, and a next version is to be prepared for discussion at the next meeting in UK.

TC2-44 Vocabulary Matters
Chair: J. Moore (UK) AD: Vandermeersch
TR: To provide liaison between Div.2 and TC 7-06 "Lighting Terminology" and support the preparation of the new edition of the Lighting Vocabulary in the field of light and colour measurements.
ST: Report given by the chairman. ILV (International Lighting Vocabulary) is being revised and this TC is responsible for D2 terms. The chairman circulated possible new terms (about 300) to members. Comments have been collected and compiled for revision, and the second mailing is being prepared. Different opinions should reach consensus in the second mailing. As a guiding

principle to assess the suitability of terms, the view taken within the TC that ILV is not a scientific dictionary, nor text book. Thus it has been agreed to eliminate technical principles and figures (which should be in technical reports) and decided that ILV should stick to strictly definitions. If other Divisions have different opinions, the policy must be harmonized.
Discussion:
Hermann (CIECB) commented that D1 has almost finished their final version of their terms. As soon as it is finalized, she will send a copy to Moore for D2 to review. D2 is one of the last ones. Director Hengstberger mentioned that the vocabulary committee would not wait for receiving all the Divisions before submitting to IEC. Submission of the terms, Division by Division, will avoid delaying the whole process. The Director proposes that D2 should have detailed discussions on the way we do this in future, at regular meetings of the Publication Board. Director Hengstberger is now the Vice President for Publications, and intends to form a Publication Board consisting of Division Editors, CIECB, and possibly some other members. The Board will have the first meeting in Budapest, just before the CIE Symposium at the end of September 1999. The vocabulary issue will be one of the issues for discussion there. Vocabulary is a living thing and should be updated much faster than in the past. Editor Moore added a point that doing this Division by Division presents a problem that there are many measurement terms used in other Divisions (particularly D1, D4, D8), and we do not always agree: we may need some new approaches.

The following TCs (2-45 through 2-49) were established last year after the Boulder meeting. The ADs of these TCs have not been assigned at the time of this meeting.

TC2-45 Measurement of LEDs - Revision of CIE 127
Chair: Kathleen Muray (USA) AD:
TR: Revise CIE Pub. 127 to include improved definitions of quantities and methods of measurement for total flux and partial flux of LEDs and to reevaluate other parts including spectral and color measurements of LEDs.
ST: Report given by C. Jones (USA) on behalf of the chairman. This is a continuation of TC2-34 and deals with additional issues to be resolved. The TC was established last year in Boulder. Two TC meetings have been held, in Gaithersburg at CORM'99 in May, and in Warsaw this time, both chaired by the chairperson K. Murray. The meeting in Warsaw focused on defining the measurement quantities for partial flux, and the TC came to an agreement on this. Next draft will be circulated within next few months for further comments. There are issues still to be addressed, including assessment of V(l) match and spectral measurements of LEDs. Next meeting is planned for April 2000 in UK.

TC2-46 CIE/ISO standards on LED intensity measurements
Chair: John Scarangello (USA) AD:
TR: To prepare a CIE/ISO standard on the measurement of LED intensity measurements based on the CIE Pub. 127.
ST: Report given by the chairman. The TC started with the original members from TC2-34. The TC first met in Gaithersburg on May 3, 1999 with the first draft discussed and some new members added. The TC met again this time in Warsaw with the second draft reviewed, and had good discussions and inputs on several key questions. The scope of the document is clarified, and the TC agreed to use other CIE publications as much as possible on detector issues and to include more information on uncertainty calculations. The TC also reached general consensus that f1' is not good for LEDs, but this issue should be addressed outside this committee, perhaps at some other TC, as it is expected that it will take substantial new work and time. The chairman will

prepare the next draft before the next D2 meeting. The first draft was put on the hidden website as a trial, which worked well. Further versions will follow the same way.
Discussion:
Director Hengstberger commented that this subject of LEDs is important for D2 in the sense that we are making contributions in the area of optoelectronics, which is new for the CIE, i.e. in some ways we are in a similar position as that of D8 in the imaging technology field. D2 published CIE127, which was very timely, and it is good to have two new TCs on LEDs immediately after publication of CIE127. This is a sensible approach i.e. not to wait for ultimate completeness of the document, but to issue what is needed at the right time. Other TCs should consider this approach.

TC2-47 Characterization and Calibration Methods of UV Radiometers
Chair: Gan Xu (Singapore) AD:
TR: Prepare a CIE recommendation on methods of characterization and calibration of broadband UV radiometers in the spectral ranges of UVA and UVB for industrial applications.
ST: Report given by the chairman. The TC started last year with the formal invitation sent out to members in November. The TC had 12 members before Warsaw conference. A target of completing the document in 2002 was set. The chairman circulated a draft table of contents in January 1999. The TC met for the first time in Warsaw with 30 attendees, discussed the revised version of the table of contents, and had active feedback from members and guests. More members are expected to join after Warsaw. The TC made decisions on some key issues. The UVNET (a three-year project under EUROMET and the EU) is developing standard documents in the same area, including one on characterization of UV radiometers (first draft produced by WG1 in October 98). The document copy was circulated among TC members with the permission of the UVNET WG1 chairman. The document has taken the identical terminology and technical approach to CIE Pub. 69. There was an initial concern on overlap and duplication of work. The TC invited two representatives from UVNET WG1 to attend the TC meeting in Warsaw, and also had a representative from the World Meteorological Organization (WMO), which also has a WG on UV radiometry for solar UV measurements. The TC has established contacts with these groups and is having friendly discussions. UVNET expressed their wish to collaborate with CIE. Thus, keeping close contact with them, the TC will continue on to develop the technical report. The chairman is still not sure if the liaison with UVNET should be kept in TC level or Division level and requested advice.

TC2-48 Spectral responsivity measurement of detectors, radiometers, and photometers
Chair: G. Eppeldauer (USA) AD:
TR: To rewrite the technical report CIE 64 (1984) "Determination of the spectral responsivity of optical radiation detectors" to update device and measurement technology, and include the spectral irradiance responsivity measurement for radiometers and photometers from UV to near IR.
ST: Report given by Chairman. After the Boulder meeting, the chairman wrote an outline of the document, mailed to 16 members of the TC, and had first meeting here in Warsaw with about 25 attendees. The scope of the paper was discussed, and it was agreed to include radiance responsivity, in addition to radiant power responsivity and irradiance responsivity that were originally proposed. The TC agreed on the table of contents and the modified structure of the report. The TC plan to meet for the second time in London. The chairman plans to finish the report in 3 to 4 years.

TC2-49 Photometry of Flashing Light
Chair: Y. Ohno (USA) AD:
TR: Produce a technical report for photometric measurements of flashing light, including derivation of the photometric quantities applied to flashing light, measurement of light sources, and calibration of photometers for flashing light.
ST: Report given by the chairman. The TC had its first meeting in Warsaw with about 25 attendees, including 8 initial members. As discussed at the Workshop in the previous week, various new issues have been recently raised in the measurement of flashing lights, especially for signaling applications in roadway, sea, and air traffic. The TC will produce the first CIE document on photometry of flashing lights, but addressing only the physical measurement aspects. The issues on human vision aspects will not be covered in this TC, but should be produced in a document from Division 1. The chairman prepared the scope and the table of contents of the document, which were discussed at the meeting. After active discussions, with several points clarified and some new suggestions made, the TC agreed on the scope and basic structure of the document. The TC added 3 new members after the meeting. The TC came to a consensus that a new document from Division 1 is urgently needed, and requests Division 1 consider this. The chairman plans to develop the first draft by next physical meeting in London, and hopes to finish the document in 3 years.

Dissolution of TCs and other functions

TC2-14 Measurement of Reflectance and Transmittance, Including Turbid Media
The document has been published as CIE 130 (1998), and the task of the TC is complete. The TC is closed.

TC2-41 Industrial photometry.
There has been no progress for the past 4 years. No new chairpersons nor any other solutions were suggested, and D2 agreed to close this TC.

R2-09 Cryogenic radiometer.
Following the proposal by the reporter, D2 agreed to close this reportership.

R2-17 Aviation Photometry
Following the proposal by the reporter, D2 agreed to close this reportership.

Liaison: ISO TC160 SC2 WG2 Glass in buildings, Light & energy transfer
This liaison is closed per proposal by the liaison officer.

Proposal for NEW TCs and Reporterships

New TCs
(1) Measurement of the optical properties of LED clusters and arrays
TR: To produce a technical report for the measurement of optical properties of visible LED arrays and clusters, to derive optical quantities for large LED arrays and recommendations for measurement methods and conditions.
Chairman: Georg Sauter (Germany)

Sauter made this proposal by stating that we now have document on measurement of single LEDs (CIE 127) and two new committees working on measurement of LEDs but still dealing with single LEDs. The same configuration or quantities cannot be used for clusters and arrays of LEDs. The application of LED arrays and clusters is expanding and there now needs to be recommendations on measurements for such groups of LEDs.

Ohno commented that similar issue (measurement of LED traffic signs) has been raised by J. Arens, who is active in D4 and D2, in some other meetings in the past, and suggested that the chairperson contact him. Goodman seconded Sauter's proposal. Answering questions, Sauter added that the spectral range covered in this committee will be the visible, and primarily photometry and colorimetry will be addressed. The proposal was approved with no objections. Sauter called for new members.

(2) Calibration of diode-array spectrometers
TR: To produce a technical report which sets out guidelines for the recommended procedures, methods and transfer standards for the calibration of diode array spectrometers.
Chairman: Richard Austin (USA)

Goodman made the proposal. There is gradual shift from fixed scanning systems to array systems, and there are a number of problems in the calibration of such systems which are unique and due to the fact that these types of spectrometers use detector arrays. Thus a recommendation in this subject is in demand. The proposal was approved with no objections.

New Reporterships
(1) Emergency Lighting Luminaires - Reporter: Lou Bedocs (UK)
As reported under the liaisons, Vandermeersch proposed this reportership, and Lou Bedocs accepted to be the reporter. D2 agreed.

(2) ISO/CIE Standards for the measurement of reflectance and transmittance
- Reporter: Danny Rich (USA)
Hengstberger pointed out that the original intention of TC2-14 was to establish standards, which was amended to a technical report. He asked if we should set up a new TC to turn the document (CIE130) into CIE standards. Moore commented as Editor that this document is extremely complicated and is covering a complete range of possible geometries and he therefore expects great difficulties in converting it to a standard. The proposal in D1 also dramatically changes some of the definitions, which makes it more difficult. D2 voted to establish a reportership this time rather than a new TC. Rich is suggested for the reporter.

(3) Classification of color measuring instruments - Reporter: Yoshi Ohno (USA)
Proposed by Ohno. At the first D8 meeting in Baltimore in Oct. 98, a reportership on grading color measuring instruments was established, with Ohno assigned as the reporter. D8 would like to have a guide on selection of color measuring instruments (including colorimeters and spectroradiometers) according to the various applications and uncertainties required. Commercial color measuring instruments do not give clear and consistent specifications. We have classification of illuminance/luminance meters in the TC2-40 draft document. Similar guidelines are needed for color measuring instruments. Ohno thinks the work must be done by D2, but does not have clear view yet of the scope of the guide and of the chairperson. The relationship with TC2-16 and the new TC on diode array spectrometers (R. Austin) should also be investigated. D2 agreed to establish a reportership on this subject. Sauter commented that the specification must be on char-

acteristics, not on the uncertainty of instruments because uncertainty can only be stated with measurement conditions.

(4) Liaison with IALA (International Association of Lighthouse Authorities) - Reporter: Ian Tutt (UK)
Proposed by Ohno. IALA wishes to publish an international standard based on their previous document "Recommendations on the Determination of the Luminous Intensity of a Marine Aid-to-Navigation lights (1977)", and is requesting assistance from D2. There is another standardization effort in Europe by AIDO (Industrial Association of Optics) and this conflict or overlap should also be resolved. (A paper representing AIDO was given by Passi Orreveteläinen in this Warsaw Session.) IALA has just established a WG to write a standard on this subject, which, they hope, is to be published as a CIE/ISO standard. We need to clarify the situation and plan for a possible new TC. Hengstberger supported it and commented that D4 encourages CIE involvement in more forms of transportation, and this area (sea navigation) applies to another form of transportation. D2 agreed to establish this reportership. Ian Tutt, a member of IALA, was recommended for the reporter.

New Liaisons; Division 8: Y. Ohno (USA)
Proposed by Ohno who has become the liaison person in D8 for D2. D2 agreed to establish this new liaison as an official channel between the two Divisions.

Committee Activity Reports:

TC2-39
Geometric Tolerances for Color Measurement
29 June, 1999

Terms of Reference:
Compile a technical report and recommendations specifying the geometric tolerances for the various geometries in colorimetry, including 0/45, 0/d and others. Parts of this technical report may be suitable for inclusion in a CIE standard specifying several geometric tolerance levels.

Working Program:
Utilize ISO 5/1 and ASTM E 1767 to develop a system of specifications for the geometry of color measurements. Define the specifications in the following order: Reflectance factor (t/8, d/8, d/0), radiance factor (45/0) and transmittance geometries (0/0, d/0). Specifications will be developed via computer simulation & verified experimentally.

Status:
The Committee met for the fifth time just prior to the CIE Division 2 meeting in Warsaw, Poland at the Technical University of Warsaw. Five committee members and six guests were present. An agenda was handed out and approved. The minutes and activity report from 1998 were reviewed and approved. There were some questions about the terminology issues that were decided at the last meeting. In reviewing the terminology it was suggested by committee members that the final report have a separate section on terminology, even though this is not standard in a CIE report. The TCC agreed to draft such a section. It was reported that none of the action items shown in the 1998 Activity Report had been fulfilled. The TCC took partial responsibility for this as he had changed affiliations and had not been able to retrieve his CIE committee docu-

ments until just recently. The members from NIST and 3M have also forgotten about their action items and the TCC was unable to find the documents to remind them. This next year will be better. A first draft of the final report was distributed for discussion. Discussions during the meeting resulted in the following actions:

- There was a general agreement on the reference specifications for the three geometries described in the draft.
- General comments included a) the report needs more figures. N. Johnson agreed to send drawings and/or PowerPoint files to include in the document; b) the scope needs to be rewritten so as to more clearly identify that the three levels of tolerances do not represent "good, bad, worse" but rather ranges of geometries suitable to various types of materials, surface effects and applications. More Lambertian materials may be successfully characterized on any of the geometries but difficult to measure specimens or material standards may require one geometry rather than another.
- It was suggested that one needs to know how the cone angles are distributed across the sample port. To do this, there should be some specification and tolerances on the size of the specimen port for any set of influx and efflux angles. One way to do this would be to analyze the geometric design of an instrument, ray by ray. The TCC feels this would be too restrictive on the color community. It was then suggested that the report change from a two parameter (influx : efflux) angle based specification to a three parameter (influx aperture, efflux aperture, specimen aperture).
- One committee member suggested that the report include two different specific examples of a design of each reference geometry to illustrate the use of the methods described in the final report.
- There was a lot of discussion about how to handle reference specification for difficult to measure specimens, such as metallic flake paints or retroreflective sheeting. The TCC will review this issue and draft a position to be included in the scope of the next draft.

Action Items:

1. During the next few months, the chairman will prepare a second draft of the final report and distribute the draft to committee members for comment.
2. NIST, Murakami and 3M have volunteered to supply some measurement data on standard and practical materials (matte, semi-gloss, glossy paint, ceramic tiles, plastics) to verify the reference geometry and the effect of the tolerances.
3. D. Couzin will talk to C. McCamy about how to transform the ISO 5 geometry system into a three parameter system and draft a defining paragraph to be added to the final report.
4. Ted Early and Maria Nadal at NIST will take the place of Leonard Hansen from NIST on the committee.
5. The TCC will contact Greg McGee of Labsphere about materials on specifying and verifying the design of integrating spheres.
6. The next draft will be written and distributed by 15 December, 1999.

   The committee desires to hold the next meeting in conjunction with the ASTM E-12 Color and Appearance meeting, to be held in Toronto, Canada in June of 2000. The TC will not be meeting during the Division meetings at NPL in April 2000.

TC 2-40
Characterizing the Performance of Illuminance Meters and Luminance Meters
Minutes of 4th Meeting in Warsaw, June 28th,1999

Opening, Presence and Membership
The meeting toke place at Polytech Warsaw, Room 149A, Monday, June 28th, 1999 with the attendance of 26 people, where 9 of the 16 members were present. The attendance list is attached.
Approval of Agenda: The agenda was distributed by the chairman and approved.
Approval of minutes from the 3rd meeting in Boulder (presented in CIE Div. 2 Activity Report August 98):
The minutes as printed in the CIE Div.2 Activity Report August 1998 have been approved.
Discussion of third draft of CIE/ISO Standard "Characterizing the Performance of Illuminance Meters and Luminance Meters", June 99: The chairman presented the 3rd draft of the document which included some of the comments of the last meeting in Boulder 1998. No further written comments had been received by the chairman from the members since then. The chairman pointed out the importance of this document for the use in the industry, especially as similar work is going on in other organizations, such as European Standardization CEN. The chairman will make available the latest draft of the CEN Standard to the members in electronic format by use of the Divisions web site.
The TC discussed the general content of the CIE/ISO Standard draft and finally made a decision on the further treatment of the document after intensive discussions about technical details, especially the characteristic of the $V(\lambda)$ match $f1'$. According to this the chairman will submit a ballot per e-mail to the members and ask for opinions whether to modify the title, introduction chapter, or scope of the document together with text proposals within the next 2 months. The chairman will add the modifications according to the majority opinions into the draft and submit it to the Associate Director for further processing through the CIE. The chairman will submit a file copy of the document to CIE to be posted on the web, so that members can easily download the document for their own use.

R2-06
Standardization of Measuring Geometry for the Colorimetry of Metallic Paints
June 10, 1999

For about six years, committees of the American Society for Testing and Materials (ASTM) and the German standards organization (DIN) have been attempting to standardized measuring geometry for measuring metallic materials. Almost all of the work has been done with the assumption that the specimen would be illuminated directionally at 45° to the specimen normal. In that case, the incident beam and the normal to the specimen define a plane of incidence and the reflected light is measured in that plane, at several angles relative to the specular direction. Such a configuration is called "uniplanar." Another somewhat different configuration has come into commercial use. The receiver is located on the specimen normal and the specimen is illuminated by a number of small illuminators arrayed in circles. For each selected angle of incidence, the illuminators are all at the same elevation angle, but at many azimuthal angles. In the terminology of the ASTM, this is called "circumferential" illumination. About a year ago, as chairman of the ASTM subcommittee on geometry, I met with the chairman of the ASTM subcommittee on metallic and pearlescent colors. We agreed that the geometry subcommittee would prepare a standard method of describing the geometry of multi-angle spectrophotometers, to provide a basis for a specific standard method of measuring metallic and pearlescent colors. The third draft of the geometry standard is in preparation and will be sent to subcommittee ballot in about a

month. It will provide the formal basis for describing uniplanar, annular, and circumferential configurations and a configuration in which the specimen is illuminated diffusely and reflected light is measured at a number of elevation angles. This last method is used with interference pigments. The subcommittee on metallic and pearlescent colors is maintaining close liaison with my committee and has begun writing a standard.

Two of my recent papers introduced a number of new concepts and associated terminology for the description of metallic materials:
Observation and measurement of the appearance of metallic materials. Part I. Macro Appearance, Color Res. Appl., 21, 292-304 (1996).
Observation and measurement of the appearance of metallic materials. Part II. Micro Appearance, Color
Res. Appl., 23, 362-373 (1998).

TC 2-36
Retroreflection: Definition and Measurement Revision of CIE Publication 54
August 27, 1999

Terms of Reference: To revise and expand CIE Publication #54 on Retroreflection. To standardized test methods and measurement geometry for measuring the photometric and colorimetric properties of all types of retroreflectors under both day and nighttime conditions. (Revised term of reference as per Warsaw meeting).
History: A reportership was established in 1991 in Melbourne to look into revising CIE Publication 54 on Retroreflection. My report indicated that many new materials had been developed since 1982 and a revision was highly desirable. In June 1992 the Board of Administration concurred and Technical Committee 2-36 was formed with the above terms of reference.
Status: This committee has meet many times in seven different countries and completed fourteen drafts of a technical report. The last meeting was held during the CIE Session in Warsaw, Poland. Six members of the thirteen members and one consultant were present at the meeting. A vote on the 12th draft was distributed before the meeting and two ballots were returned with one comment and two negatives. After a worthwhile discussion some of the comments were included and the negatives considered persuasive and resolved by additional changes and wording. Comments were also received from the editor and accepted. A new summary will be written. A bibliography will be included as soon as possible but should not hold up the Division balloting. One additional draft was written and comments received from several members and upon many e-mail correspondence, a 14th draft was prepared. This draft approved by the members was sent to the Division Director, Editor and Central Bureau for voting. The terms of reference were modified by dropping the requirement for a CIE/ISO standard as the committee decided this was best to be left to a new Technical Committee to extract the information from this report appropriate for standards use.
Dependent on the results of the ballot the comments or negatives will be resolved without holding another meeting before the Division 2 meets again. Formal approval would then await the next Division 2 meeting.

Berichte über CIE – Publikationen

Publikation CIE 135 (1999) **CIE Collection: Sehen und Farbe; Physikalische Messungen von Licht und Strahlung**

Dieser Band beinhaltet kurze technische Berichte, die von verschiedenen Technischen Komitees und Berichterstattern in den CIE Divisionen 1 und 2 erstellt wurden.

135/1: Physiologische Blendung
Auf Grund einer vorhergehenden theoretischen Analyse experimenteller Blendungs-daten, veröffentlicht in CIE Kollektion (Vos und van den Berg, 1997 [14]), und resultierend in einer vollständigen Blendungsformel für den ganzen Winkelbereich zwischen 0° und 100°, werden drei vereinfachte Formeln präsentiert, jede gültig in einem spezifischen Blendungswinkelbereich. Dieses Ensemble von drei Formeln wird empfohlen, um einen CIE Standardblendungsbeobachter zu definieren; die einfachste Formel, die Alter-adaptierte Stiles-Holladay Formel, wird in den meisten Anwendungsfällen genügen.

135/2: Farbwiedergabe, Schlussbemerkungen
Die CIE "Test-Methode zur Berechnung des Farbwiedergabe-Index" hat eine lange und komplizierte Geschichte. Nach der ersten Veröffentlichung in 1965 und einer neuen in 1974 wurde bald erkannt, dass weitere Ergänzungen notwendig sind. Ein Technisches Komitee (TC) hat auf diesem Gebiet in der 80er Jahren gearbeitet, musste jedoch ohne konkrete Empfehlung geschlossen werden, da sehr unterschiedliche Meinungen unter den TC-Mitgliedern bestanden. Ein zweiter Versuch wurde nach der CIE-Tagung 1991 gestartet. Dieses TC arbeitete unter verschiedenen Vorsitzenden während 6 Jahren, und erneut musste es ohne konkrete Ergebnisse geschlossen werden, obwohl die TC-Mitglieder sich in einigen Punkten einigen konnten. Der vorliegende Bericht zählt die Punkte auf, worüber unter den TC-Mitgliedern Einigung erzielt wurde, und nennt die Punkte, für die eine Einigung nicht erzielt werden konnte. Zur letzten Gruppe gehören zwei Probleme: Gebiete, wo die CIE sehr bald Empfehlungen verabschieden wird, die in die Berechnung des Farbwiedergabe-Index einfließen (z. B. neue Farbumstimmungstransformation) und Empfehlungen, wo eine politische Entscheidung der Lampenhersteller notwendig ist. Eine Änderung der Berechnungsmethode wird notwendigerweise ein Lampenspektrum, verglichen mit einem anderen, bevorzugen. Die gegenwärtigen Schlussbemerkungen fassen die Punkte zusammen, die in der letzten Dekade im TC diskutiert wurden. Sie benennen solche Punkte, die eine Übereinstimmung erlauben, und heben die Punkte hervor, wo eine zusätzliche Forschung notwendig ist, um eine Übereinstimmung zu erreichen.

135/3: Virtuelle metamere Paare zur Bewertung der spektralen Qualität von CIE Lichtart D50 Simulatoren
Die Publikation CIE 51-1981 beschreibt eine Methode zur Bewertung der Qualität von Simulatoren der CIE-Lichtarten D55, D65 und D75 (verschiedene Tageslichtphasen) für Farbmessgeräte sowie für visuelle Beurteilung und Abmusterung von Farbproben. Die spektrale Strahlungsverteilung des Simulators wird gemessen und die Abweichung von der idealen Verteilung in Größen des Farbabstandes zwischen virtuellen metameren Paaren, die unter der idealen CIE-Lichtart gleich aussehen, berechnet. Die CIE-Lichtart D50 wird für Anwendungen in der Photographie und im Farbdruck simuliert. Diese Ergänzung stellt die virtuellen metameren Paare zur Verfügung, die für die Anwendung der Methode zur Bewertung von D50-Simulatoren benötigt werden.

135/4: Einige neuere Entwicklungen bei der Farbabstandsbewertung

Ein geraffter Überblick über Entwicklungen bei der Farbabstandsbewertung wird gegeben, der zurückführt bis zu den frühen Anfängen durch MacAdam. Farbmetrische Daten farbiger Proben sind mit Urteilen über kleine Farbunterschiede im Sinne einer Normal-Statistik korreliert, aber in einem dreidimensionalen Raum. Eine große Variation experimenteller Nebenbedingungen bei Untersuchungen über kleine Farbunterschiede erschwerten Vergleiche zwischen verschiedenen Studien. Einige externe Einflussfaktoren konnten identifiziert werden. Neuere Datensätze ergaben sich aus stark verbesserter Kontrolle der experimentellen Nebenbedingungen. Sie bilden eine neue Basis für die Entwicklung neuer Farbabstandsformeln. Die CIE ist die internationale Organisation, die Forschungsarbeiten zur Optimierung der Farbabstandsbewertung anregt. Die verschiedenen Stufen, Formeln zu empfehlen und die Ergebnisse intensiver Forschungsarbeiten auszutauschen, weisen eine enge Verbindung zwischen Praktikern und Theoretikern auf, jedoch reagieren Industrievertreter im allgemeinen schneller. Dennoch bleibt die CIE die Mutter-Organisation für internationale Diskussion und Übereinkunft. Die jüngsten Entwicklungen auf dem Gebiet der Farbabstandsbewertung zeigen eine Beschleunigung der Arbeit in den Technischen CIE-Komitees. Ihre Untersuchungen verbesserten zunächst die CIELAB-Formel und versuchen nun, die Lücke zwischen der CIE94- und der älteren CMC(l:c)-Formel zu schließen. Eine neue Idee wird vorgestellt, die Optimierung einer Farbabstandsformel nicht auf die Komponenten der Differenzterme in der Formel zu stützen, sondern auf die Basiskoordinaten, so dass eine Vektordefinition des Farbabstandes wie in der CIELAB-Formel erhalten bleibt. Eine internationale Diskussion über diesen Aspekt wird angeregt als nächster Schritt für eine weitere Verbesserung der Farbabstandsbewertung.

135/5: Visuelle Adaptation an eine komplexe Leuchtdichteverteilung

Eine der wichtigsten und schwierigsten Aufgaben in der Bewertung der wahrgenommenen Helligkeit unter Alltagsbedingungen ist die Beurteilung des Adaptationsniveaus des visuellen Systems. Besonders ist das ein unvermeidlicher Prozess, wenn das neue photometrische System in die Praxis umgesetzt wird. In dem vorliegenden Bericht wurden mehrere Studien rezensiert sowie Aufgaben und Probleme des zukünftigen Technischen Komitees diskutiert. Obwohl viele Studien über Helligkeitswahrnehmung potentiell mit dem Thema Adaptationsniveau in Beziehung stehen, konnte keine Fachliteratur gefunden werden, die diese Sache explizit behandelt. Alles was jetzt getan werden kann, ist Wissenschaftler zu ermutigen, die Forschung 6ber das Adaptationsniveau nicht nur unter Experimentierbedingungen, sondern auch in natürlicher und komplexer Umgebung durchzuführen.

135/6: Spektraler Reflexionsfaktor von gepresstem Polytetrafluoroäthylen (PTFE)-Pulver in der Messgeometrie 45°/0°

Als Reflexionsstandard für den Reflexionsfaktor in der Geometrie 45°/0° wurde gepresstes Polytetrafluoroäthylen (PTFE)-Pulver verwendet. Anwender radiometrischer und spektroradiometrischer Messgrößen wie z. B. das 'Council for Optical Radiation Measurements (CORM)' haben auf die Notwendigkeit eines Standards in der Qualitätskontrolle und Qualitätsabschätzung hingewiesen. Diese Veröffentlichung beschreibt die Messapparatur, die zur Messung des spektralen Reflexionsfaktors von gepresstem PTFE-Pulver im Spektralbereich von 380nm bis 770nm benutzt wurde. Es wird auch der Einfluss der Probenpräparation auf den Reflexionsfaktor in der Geometrie 45°/0° diskutiert. Die erweiterte Messunsicherheit bei einem Erweiterungsfaktor 2 für den Reflexionsfaktor in der Geometrie 45°/0° liegt im Bereich von 0,009 bis 0,017.Die Publikation enthält auch die kurzen Zusammenfassungen aller CIE Publikationen, die in den Divisionen 1 und 2 erarbeitet wurden. Die Technische Kollektion ist in englischer Sprache verfasst, mit kurzen Zusammenfassungen in Deutsch und Französisch. Sie enthält 78 Seiten und kann bei der Geschäftsstelle der DfwG bestellt werden.

World Wide Web

Interessante Adressen aus dem Internet

American Society for Testing Materials	ASTM	www.astm.org	
Applied Optics, Journ. Opt. Soc. of Am.	JOSA	www.osa.org	
CIE Division 1	CIE D-1	www.nml.csir.co.za/~cie1/	(04.00)
CIE Division 2	CIE D-2	www.nml.csir.co.za./~cie2/	(04.00)
CIE Division 4	CIE D-4	www.cie.co.at/cie/div4/index.html	(03.00)
CIE Division 8	CIE D-8	www.colour.org/tc8	(06.99)
Commission Européenne de Normalisation	CEN	www.cenorm.be	
Commission Internationale de lÉclairage	CIE	www.cie.co.at/cie/home.html	(05.00)
Council of Scientific Industrial Research	CSIR	www.csir..co.za	
Deutsches Institut für Normung	DIN	www.din.de	
International Standardization Organization	ISO	www.iso.ch	
National Inst. for Standards and Technology	NIST	www.nist.gov	

Farbmessgerätehersteller:

http://www.byk-gardner.de
http://www.datacolor.com
http://www.drlange.de
http://www.gretagmacbeth.com
http://www.lmt-berlin.de
http:///www.minolta.com
http://www.optronik.de
http://www.x-rite.com
http://www.techkon.com

Künftige nationale und internationale Veranstaltungen

08. 05. 2000	Instr. Weißbew. Textil-, Papier- und Lackindustrie, TA Hohenstein
03. – 07. 09. 2000	CIE Divisuion 4, Toronto, Kanada
06. – 07. 11. 2000	AIC Interim Meeting Color and Environment, Seoul, Korea
20.10. 2000	**DfwG-Jahrestagung 2000, Lichttechn. Inst. Der TH Darmstadt**
11. 11. 2000	Communication on Color Information, Scottsdale, USA
23. – 25. 10. 2000	Farbmessung in der Drucktechnik, FOGRA, München
16. – 18. 11. 2000	Farbmeßkursus in Esslingen
19. – 20. 02. 2001	Farbmeßkursus in Esslingen
2. Hälfte Mai 2001	NIST 100-Jahr-Feier, Gaithersburg,Maryland, USA
14. – 16. 05. 2001	CORM im NIST, Gaithersburg, Maryland, USA
17. – 18 .05. 2001	CIE Division 2, NIST Gaithersburg, Maryland, USA
24. – 29. 06. 2001	**AIC-Tagung, Rochester, NY, USA, Riverside Convention Center**
Juli 2001	Tagung: International Color Vision Society in Cambridge
Sept. 20001	Symposium on Beautification, Istanbul (with CIE Midterm Session)
01. – 10. 07. 2003	CIE Tagung in San Diego, Kalifornien, USA
2003	Tagung: International Color Vision Society in Seattle, USA

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Beitrittserklärung

[ ] persönliches [ ] korporatives Mitglied

Hiermit erkläre(n) ich /wir meinen/unseren Beitritt zur
Deutschen farbwissenschaftlichen Gesellschaft (DfwG) e.V.
und zahle den jeweils anfallenden Jahresbeitrag in der festgelegten Höhe bei Fälligkeit auf das Konto der DfwG

Der Jahresbeitrag beträgt für: persönliche Mitglieder: **DM 25,– [ ]**
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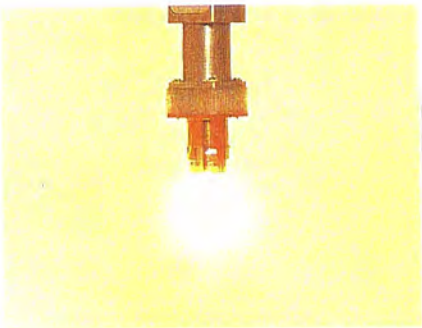

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