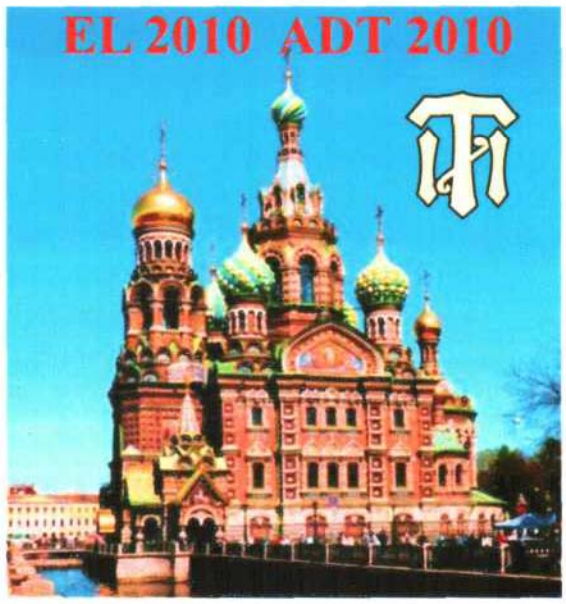
15th INTERNATIONAL WORKSHOP ON INORGANIC AND ORGANIC ELECTROLUMINESCENCE
&
2010 INTERNATIONAL CONFERENCE ON THE SCIENCE AND TECHNOLOGY OF EMISSIVE DISPLAYS AND LIGHTING
&
XVIII ADVANCED DISPLAY TECHNOLOGIES INTERNATIONAL SYMPOSIUM



St-Petersburg State Institute of Technology (Technical University)
St-Petersburg, Russia

September 27 – October 1, 2010

PREFACE

The **EL&ADT-2010 Conference** held in St. Petersburg from September 27 to October 1, 2010 combines the **15th International Workshop on Inorganic and Organic Electroluminescence**, **2010 International Conference on the Science and Technology of Emissive Displays and Lighting** and **XVIII Advanced Display Technologies International Symposium**. This event follows a historical series of International Workshops started in 1980 on Inorganic Electroluminescence and expanded in 1988 to include Organic Electroluminescence. The **Conference on Display Phosphors** was initiated in 1995. The two events merged in 2002, and since then they have been held biannually. In 2010 the conference program is merged with the **Advanced Display Technologies** series of conferences held every year in turn in Russia, Byelorussia and Ukraine.

In 2010 the event is practically organized by the St. Petersburg State Institute of Technology (Technical University), particularly by the Department of Materials Science.

The meeting covers all aspects of science and technology of inorganic and organic electroluminescence, phosphors and display devices, relating materials and metrology approaches. The Conference program includes 21 invited lectures, 56 oral and 77 poster presentations divided into 9 sessions: Phosphors for Displays, Backlight and Lightings; Organic Light Emitting Diodes; Liquid Crystals and LCDs; 3D Displays; Inorganic Electroluminescence; Light Emitting Diodes; Emissive Devices; Display Materials; Display Metrology.

We sincerely welcome all the participants of EL&ADT-2010 Conference. We believe the Conference will provide extensive possibilities to exchange, disseminate and discuss the knowledge, views and opinions on the modern trends, prospects and achievements in all the spheres and directions of R&D activities in the fields of materials, technical enhancements and metrological approaches for electroluminescence and display technologies. We would like to thank all members of Organizing and Program Committees as well as sponsors for the input into organization of conference.

Chair	M. Sychov, St. Petersburg State Institute of Technology
Co-chair	S. Mjakin, St. Petersburg State Institute of Technology

ORAL PRESENTATIONS

Spectrocolorimeter for measuring color characteristics of the sources of optical radiation

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The report is devoted to spectrocolorimeter "TKA-VD", elaborated by «TKA Scientific Instruments» for measuring the chromaticity coordinates and correlated color temperature of the light sources, including displays, light boards, advertising displays and cinema screens.

The general concept of the device

To determine the color characteristics of optical radiation, there is used the spectrophotometric method. The device represents a polychromator on a diffraction grating with registration of a decomposed radiation by a photodiode line.

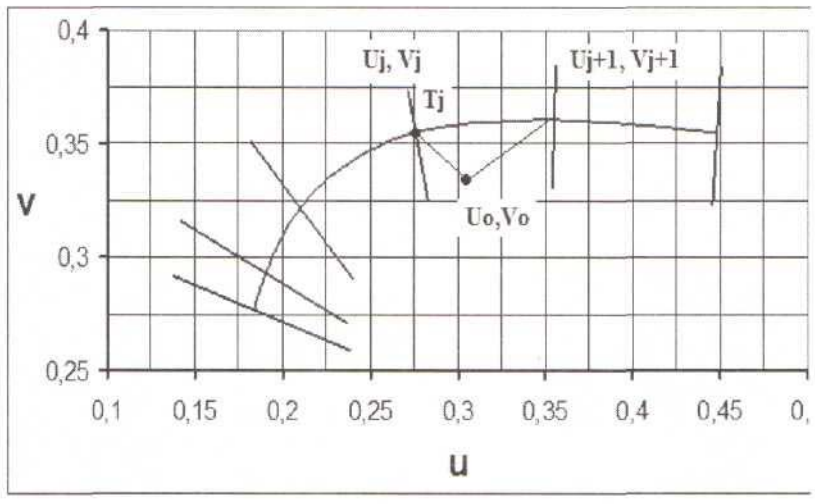
Initially there is determined a spectral content of the source of optical radiation. Then there is made a calculation of the color coordinates of the X,Y,Z sources within the visible spectrum. The color coordinates were calculated following the formula:

$$x = X / (X + Y + Z), y = Y / (X + Y + Z). \quad (1)$$

Then there is made a transition from CIE 1931 x,y color coordinates to a more uniform CIE 1960 u,v system following the formulas:

$$u=4x/(-2x+12y+3), v=6y/(-2x+12y+3). \quad (2)$$

In the next phase, based on an array of ABB chromaticity coordinates and a corresponding array of temperatures, upon a minimum distance, there is determined a temperature of the source under study T_j, corresponding to a certain chromaticity point (u_j, v_j), (fig.1).

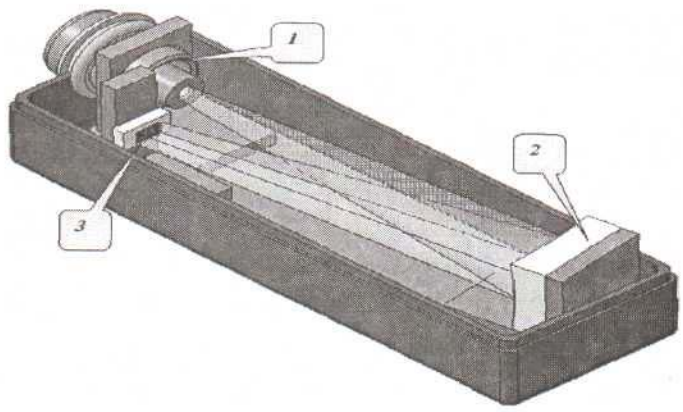


(u_0, v_0) – chromaticity point of the source under study;

(u_j, v_j), (u_{j+1}, v_{j+1}) – nearest points on the ABB line.

Fig. 1. ABB line in the u,v chromaticity coordinates system.

The radiated emission of the source under study, going through a device for forming a spatial characteristic, comes to a disperser. Photodetecting device (PD) of spectrocolorimeter based on polychromator is shown in fig.2.

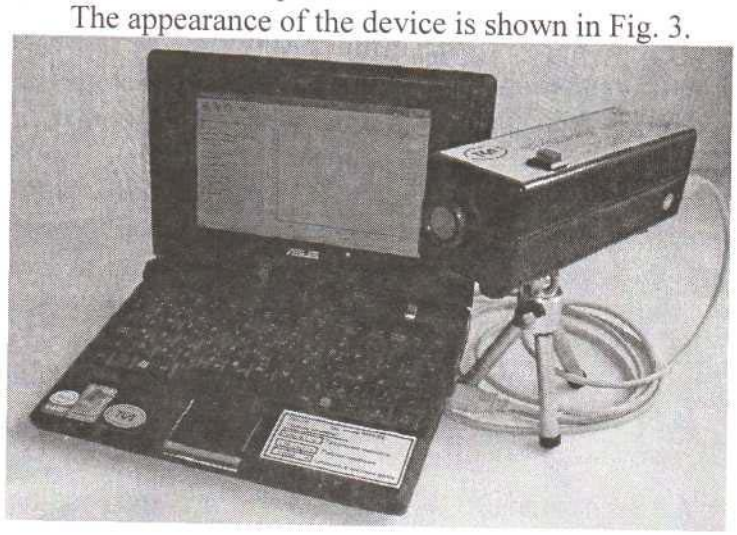


1 – part for forming a spatial characteristic (lens or opal glass),
2 – disperser (diffraction grating),
3 – photodiode line.

Fig. 2. Photodetector of spectrocolorimeter

For measuring colorimetric characteristics of displays there are used optical elements, carrying the image into the input slit.

The appearance of the device is shown in Fig. 3.



Absolute error ±0,005 in x,y CIE;
6 orders' range of linearity;
Spectral resolution < 3 nm;
Spectral range (380…750) nm.

Fig. 3. Spectrocolorimeter «TKA-VD»

The device is designed on the basis of a one-chip microcontroller (MCU) using digital methods of processing and displaying information.

When measuring the brightness of the self-luminous objects (display screens, light boards), with not very strict requirements to the sizes of the luminous surface (diameter not more 10 mm), formation of a spatial sensibility of luminance meters is possible without use of optic. A formation device can be done as a simple tube, which geometrical sizes are determined according to the solving problems. Use of laser targets, successfully applied in recent times in many devices, is also possible for luminance meters without violation of correctness of luminance measurements for extended sources of optical radiation. Non focusing lenses are well-suited for distance determination of luminance for extended sources of optical radiation. Together with it, a substantial simplification of the luminance meter structure does not influence its metrological characteristics.

One can use PC as a signal processing unit, significantly expanding the functionality of the device, especially, graphical display of measured and calculated parameters, as well as their deviation from the set (standard) values. Own software significantly accelerates the elaboration.

The knowledge of a spectral content of the investigated source of optical radiation provides for solving practically all colorimetric problems for a researcher.