THE EFFECT OF SQUARE PULSES ON ELECTROLUMINESCENCE BRIGHTNESS WAVE

I.Burić, B.Drašković and M.Stoilović
Institute of Physics, Belgrade, SFR Yugoslavia

The effect of unipolar pulses ranging from 600 to 900 V in the frequency region 300-1400 Hz on the electroluminescence brightness wave of a ZnS:Cu,Cl phosphor was investigated. The phosphor was prepared by a special method for the copper and chlorine doping /1/ of phosphorescent ZnS as provided by the Touzart-Matignon firm. The pulse source used was a high-voltage amplifier with a rise time of the order of 1μs and a maximum amplitude of 1200 V /1/.

It is well known /2/ that a brightness wave accompanies a change in applied voltage, so that to every change in voltage (an increase or a decrease) there corresponds one brightness wave peak. We have studied the time dependence of brightness wave with decreasing voltage, as well as the phase shift of brightness wave peaks with respect to the beginning of voltage change.

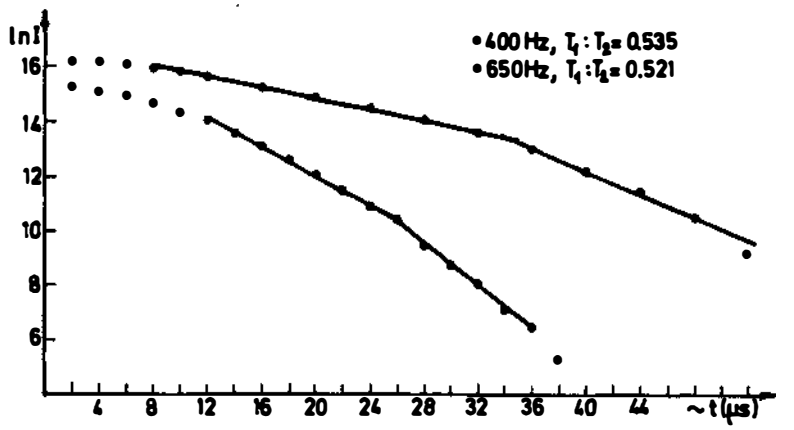

Fig.1. Decay of the peak of a brightness wave arising as voltage is removed.

The decay law is of exponential character but with two decay times, which indicates that we are dealing here with recombination at two kinds of luminescence center (the so-called blue and green luminescence centers; see Fig.1). This is in accordance with the previously analyzed spectral distribution of this phosphor /1/.

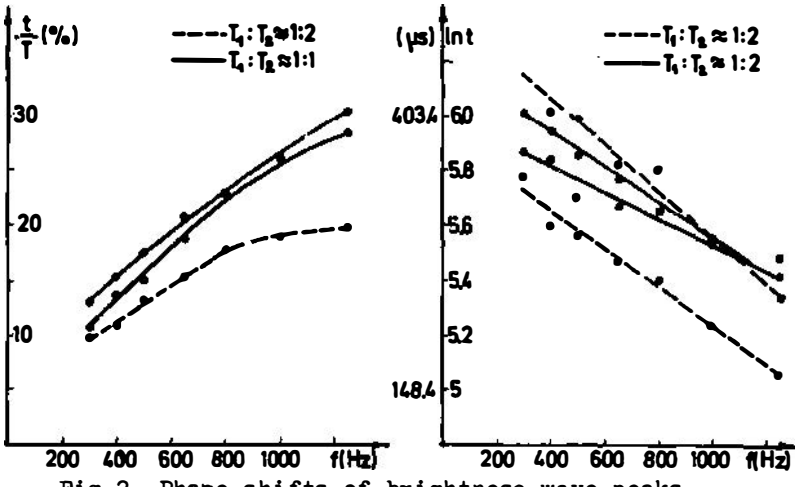

Fig.2. Phase shifts of brightness wave peaks :
• - as voltage is applied,
• - as voltage is removed.

Brightness wave phase shifts were studied in relation to applied voltage at each change in voltage for two ratios of pulse duration (T_1) to pulse absence (T_2), viz. $T_1/T_2 \approx 1:1$ and $T_1/T_2 \approx 1:2$. The phase shift measured with respect to the beginning of change in voltage was found to decrease exponentially with increasing frequency over the frequency range examined. If the phase shift is interpreted in terms of the period of applied voltage T ($T = T_1 + T_2$), it is noticed that it first increases linearly with frequency at lower frequencies, whereas at higher frequencies it becomes approximately constant.

(1) M.A.Thesis, M.Stoilović, Belgrade, 1976.
(2) I.K. Verešćagin "ELEKTROLUMINESCENCIJA KRISTALOV", NAUKA, Moskva 1974.