

### **A method to obtain correct radiation spectra using a non-linear detector**

The correct emission spectrum of a radiation source is very important in the construction of photometric instruments. This article presents a method to obtain correct spectra of radiation sources using a spectrum monitoring device which consists of a monochromator, a photo-multiplier tube (PMT) and an X-Y chart recorder.

For convenience, the emission spectra of radiation sources used in colorimeters (Tungsten filament bulbs and LEDs) are discussed to explain this method. To obtain the spectrum, the selected radiation source is fixed at the entrance of the monochromator which consists of a reflective grating. The PMT scans the spectrum and amplifies it to record on a X-Y chart recorder.

Using the above method, the spectrum of a tungsten filament bulb and different coloured LEDs were recorded. Because of the non-linearity of the reflectance coefficient of the grating  $-G(\lambda)$  and the cathode response of the PMT  $-P(\lambda)$ , the monitoring device records the intensity of the radiation improperly.

The reflectance coefficient of the grating  $-G(\lambda)$  and the cathode response of the PMT  $-P(\lambda)$ , in the wavelength range 310 nm - 700 nm were tabulated using their curves provided by the manufacturer. Multiplying these for factors  $-G(\lambda) \times P(\lambda)$  each wavelength was prepared. For convenience, the resultant response curve was considered as a polygon and linear equations for each straight line were derived. Using these equations, the resultant spectral response (f) to obtain the corrected radiation spectra. By applying the correction method it was possible to obtain the exact spectra of radiation sources.