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Abstract: Modeling spectrophotometric parameters of the SSL luminaire with a separated phosphor

The presented doctoral thesis concerns original method of PW Mamplitude modulation of a monochromatic radiation emitter, coupled with a separated rotating sector phosphor.Using a single emitter with 455 nm source, a seamless and dynamic change of the closest color temperatureCCTparameter was realized, in range from 2700 K to 5000 K, maintaining stability of quality parameters of white light. Additionally, an overall efficiency of aSSL luminaire remains constant, regardlessof the settled operating point.

The main contribution of the work is an implementation ofa practical prototype of SSL luminaire system with a designed optical guide, along with numerical calculations.A mathematical model of linked PWM generator hardware counter settings with obtained CCT color temperature was made, where the simultaneous analog regulation of luminous flux value was preserved.

The electronic system controlling operation of a stepper motor as well as modulation of an emitter power signal is based on the CPU of AVR family, while the main execution program is written in low – levelassembly language. An important, from the control system point-of-view, analog part of the circuit was initiated on an 8-bitDACconverter. Furthermore, the thesis contains an extensive review ofliterature concerning photoluminescence phenomenon and the light properties of phosphor itself.

The dissertation is divided into several chapters, in which introductory parts characterize the available solutions, presented in the literature, based on modulation of the emission of white light in the system of the separated phosphor. The luminous characteristics of materials converting white light, in terms of physical and chemical parameters, are discussed in detail.