DEVELOPPING OF AN ALGORITHM FOR TEMPERATURE CONTROL OF TLD SYSTEMS

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1. INTRODUCTION

In a typical thermoluminescence experiment, a sample rests on a metallic strip which is heated in a controlled fashion so that the strip temperature rises linearly with time.

Ramping rates consistent temperature differences are likely to be important so we should examine characterization of TLD systems.

The use of microprocessor control gives the instrument flexibility not available to hard-wired systems, and has great potential for further development.

Between control system and the user, an interface was coded using visual basic. With adding control modules, communication was installed between electronic system-micro processor and interface.

It is aimed that practical, reliable and stable TLD system is needed for medical applications. Most important criteria is linear temperature rising for TLD heating. At present there are several approaches for linearity. On-off control and proportional control are used as algorithm. This linearity is performed in a bandwidth. The purpose of the study, is provide more narrow bandwidth.

It is needed a generalized algorithm that is independent on programming languages. We used a technique that is adding smallest fraction of temperature to rising temperature with controlling step by step at every fraction to narrow the bandwidth.

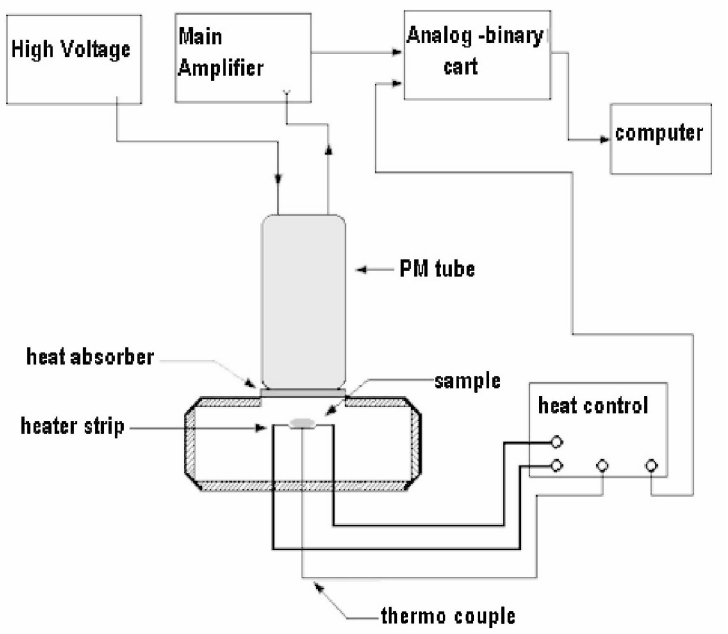


Figure 1. TLD Systems schema that include heat control unit

2. MATERIAL AND METOD

It is aimed that a generalized algorithm that is independent on programming language. Some approaches have been examined such as Fourier analysis. Microprocessor-controlled heater for the study of thermoluminescence is described. This system enables a programmed nonlinear heating profile to be used to facilitate glow curve analysis. For heating function usualy Fourier approaches is used. Rarely different mathematical methods take place in program code. Despite all, physical conditions can be different mathematical foresight.
The purpose is making oscillations of heating optimum. For this the approach is,

$$Q_{control} = P\left[\Delta T + \frac{1}{\tau_{int}}\int_0^t \Delta T dt' + \tau_{dif}\frac{d\Delta T}{dt}\right]$$

Where P is proportional benefit, τ_{int} and τ_{diff} are integral differantial time constants. These are experimental values. In this algorithm study principle is writing the equation as code.

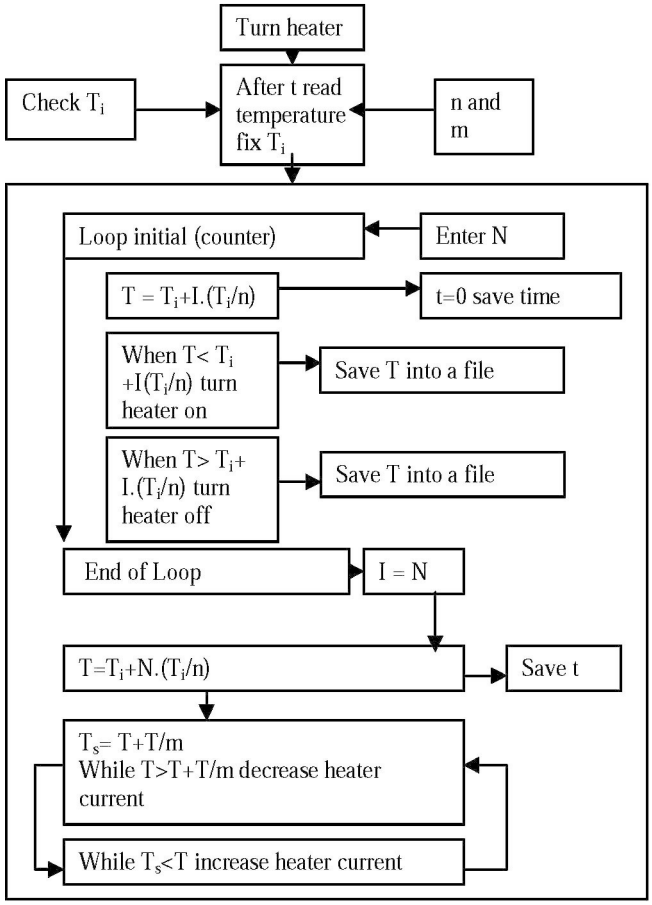


Figure 2. Developed algorithm for uniform heat progress

3. CONCLUSION

Mathematical method was embedded into the algorithm. Generalized algorithm that is independent on the code was simplified. A mathematical approach was performed between Fourier method and smallest squares method. In which we substantiated with realized control algorithm is been improved. Hardware developments will not affect algorithm validation.

4. REFERENCES

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