

Development of mains voltage stabiliser for low power applications

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The objective of this work has been the development of mains voltage stabilizer for low power application at the consumer end relevant to where it is used. However, there is no quantitative data bank on the extent of the mains voltage instability at the consumer end. Therefore, as part of this work, mains voltage level was monitored at different careful chosen locations in Dar es Salaam. It was observed that the extent and pattern of instability varied considerably from place to place. However, the extremes were observed to be -40% and 17.4% of the nominal value of 230V. A study on the different methods that could be used to effect regulation in relation to the objective of this work, made me deduce that the use of tap changing regulating scheme in an auto-transformer mode is the most appropriate method. Furthermore, it was chosen to use solid state relay to effect tap changing. The implications of using solid state relays while ensuring reliable operation has been dealt with. It is advocated in this work that the re-triggering of triacs at zero current instead of zero voltage condition enhances reliability in operation. Methods to detect zero current condition are given. The thesis gives a number of possible approaches to the means of controlling the regulation action and to display the output voltage. A number of prototypes were constructed and tested. The performance is quite satisfactory in that the regulator could maintain the output at $\pm 2\%$ of the nominal value of 230V when input varied between -40% and +26% of the same nominal value.