STATEMENT

This dissertation is submitted to Ain Shams University for the degree of M.Sc. in Electrical Engineering.

The work included in this thesis was carried out by the author in the department of Electronics and Computer Engineering , Ain Shams University , from September 1985 to December 1988 .

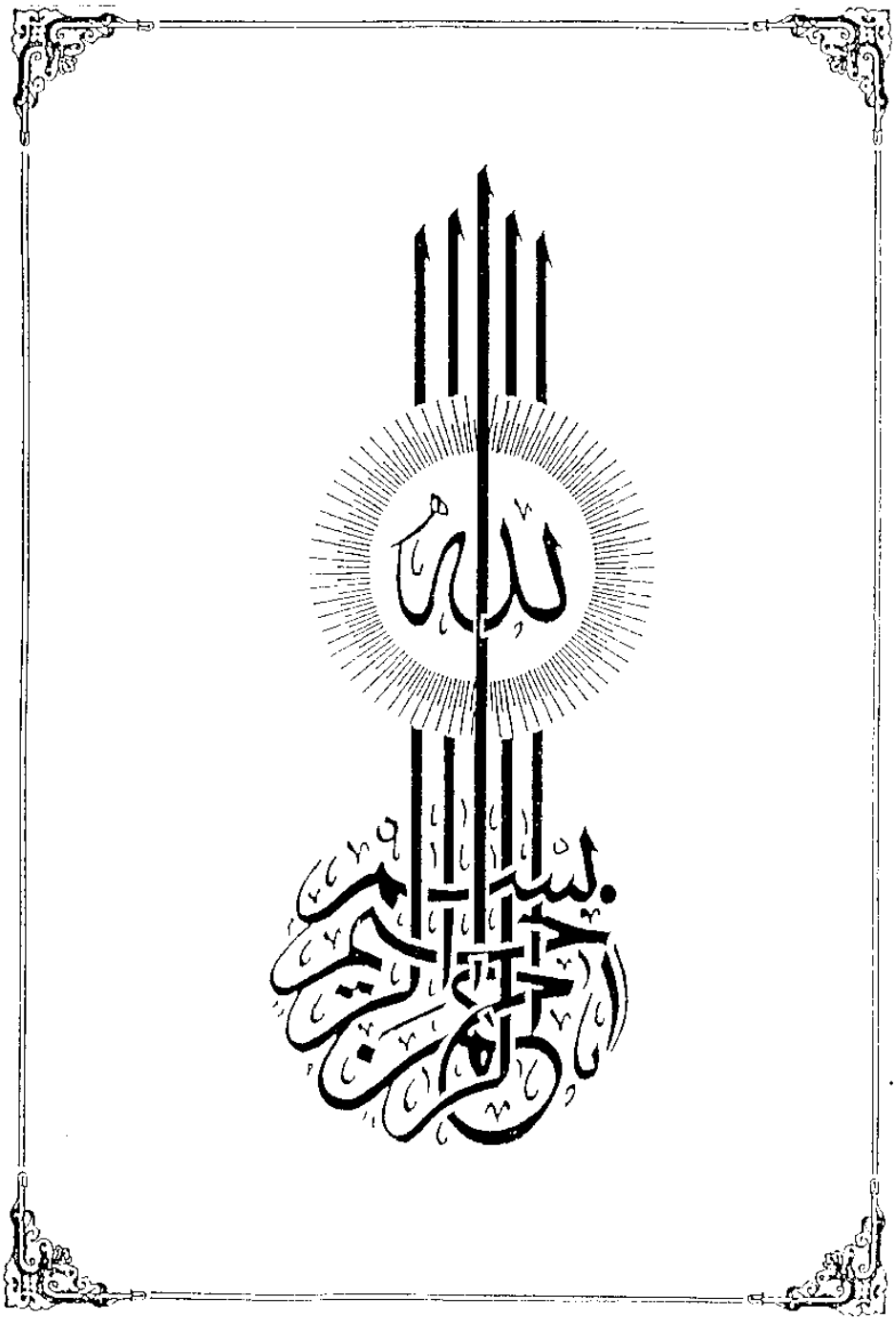
No part of this thesis has been submitted for a degree or a qualification at any other University or Institution.

Date : 25 / 12 / 1988

Signature :

Name : Wahied Gharieb

TO MY FAMILY



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ABSTRACT

This thesis is concerned with the analysis, design and simulation of variable structure control systems (VSS) in general state space form. A detailed study has been made to find the Reachability Conditions that will guarantee the hitting the sliding hyperplan(s) from any point in the state space.

Stability conditions of the resulting motion along the sliding regime are established. Invariance conditions for random disturbance and parameter variations on the variable structure control systems has been investigated. Minimum preliminary response time before switching occur has been achieved by investigating the controller chatter gains.

Large scale variable structure control systems are designed by decomposing them into subsystems which are linked together under supervisory control (Decentralized Control).

A computer aided interactive design package has been developed for the variable structure control systems, expressed by a general form of the state space continuous and discrete models.

Practical application has been implemented on thermal process by using a PC microcomputer, its control algorithm is designed according to variable structure control system techniques.

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