PREFACE

It is well known that the existing mathematical models of motors are multivariable, nonlinear, and strongly coupled, therefore these systems can exhibit complex behaviors It is now a common belief that understanding and utilizing the rich dynamics, such as bifurcations and chaos, of nonlinear systems have an important impact on the modern technology. In this work , an attempt has been made to study the nonlinear phenomenon in Generalized Electrical Machines and that approach is applied to other machines to study its effectiveness.

In Chapter 1, the study of Nonlinear Phenomenon in the field of electrical machines done so far outlined. The literature survey is furnished. The scope of the present work is described and the relevance of the work is established.

In Chapter 2, the basic idea about the nonlinear phenomenon , bifurcation and chaos has described in brief so that it can be used as a ready reference.

In Chapter 3, the bifurcation and chaos in Lorenz like systems have been studied. as the dynamic equations of conventional electrical electrical machines and generalized machine are similar to those of Lorenz like systems with higher dimensions. Therefore, the idea about the bifurcation and chaos of Lorenz like systems will in turn be very helpful for the present work.

In Chapter 4, the generalized theory of electrical machines alongwith the recent development are outlined so that it can be applied to model the conventional electrical machines effectively.

In chapter 5, the nonlinear phenomenon in Generalized Electrical Machines have been studied in details. Initially, it has been studied for exact model of Generalized Electrical Machine. Then, it has been studied for the approximate model. Both models

of the Generalized Electrical Machines have been simulated and the results of the simulation have been furnished. The results show that the machine may operate with periodicity one, two or more or become chaotic with different sets of parameters. On the basis of the observations, the nonlinear phenomenon in other conventional machines have been outlined.

In chapter 6, the approach followed in studying the nonlinear phenomenon in Generalized Electrical Machines has been applied to conventional machines and the effectiveness has been studied.

Finally the conclusion and future works are outlined in chapter 7.