

**COMPARATIVE STUDY OF HIGHER ORDER  
REDUCTION METHODS**

*A project report submitted in partial fulfillment of the requirements  
For the award of the degree of*

**BACHELOR OF TECHNOLOGY  
IN  
ELECTRICAL & ELECTRONICS ENGINEERING**

Submitted by

**CH KRANTHI MOHAN  
(18815A0209)**

**P DIVYA PRACHOTHAN  
(18815A0224)**

**S APPALA RAJU  
(18815A0229)**

**S HAREESH  
(18815A0231)**

**J VENKATA NAVEEN KUMAR  
(18815A0236)**

Under the Esteemed Guidance of

**Mr. P VARAHALA DORA**

**Assistant Professor**



**DEPARTMENT OF  
ELECTRICAL AND ELECTRONICS ENGINEERING**

**AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY**

(Permanently Affiliated to Jawaharlal Nehru Technological University, Kakinada, AP)

(An NAAC Accredited Institution)

Tamaram, Narsipatnam, Visakhapatnam-531113

**2020-2021**



**AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY**  
(Permanently Affiliated to Jawaharlal Nehru Technological University, Kakinada, AP)  
(An NAAC Accredited Institution)  
Tamaram, Narsipatnam, Visakhapatnam-531113

**DEPARTMENT OF  
ELECTRICAL AND ELECTRONICS ENGINEERING**



**CERTIFICATE**

This is certify that the project report entitled “COMPARATIVE STUDY OF HIGHER ORDER REDUCTION METHODS” is a bonafide work submitted by CH KRANTHI MOHAN, P DIVYA PRACHOTHAN, S APPALA RAJU, S HAREESH and J VENKATA NAVEEN KUMAR in partial fulfillment of the requirements for the award of degree of

**BACHELOR OF TECHNOLOGY  
IN  
ELECTRICAL & ELECTRONICS ENGINEERING**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, KAKINADA**

During the academic year

**2020-2021**

  
**Internal Guide**

**Mr. P Varahala Dora**

Assistant. Professor  
Dept. of Electrical & Electronics Engg.  
Narsipatnam.

  
**Dr. T Srinivasa Rao**

**Professor & HOD**

Dept. of Electrical & Electronics Engg.  
Avanthi Institute of Engg. & Tech. AIET,  
Narsipatnam.



## ABSTRACT

In this project a method is proposed for finding stable reduced order models of single-input-single-output large scale systems using Factor division algorithm and the mixed mathematical method. The denominator polynomial of the reduced order model with respect to original model is determined by forming the clusters of the numerator polynomial with respect to original model are obtained by using the mixed mathematical method. The mixed methods are simple and guarantee the stability of the reduced model if the original system is stable. The methodology of the proposed methods illustrated with the help of examples from literature.

|             |  |     |
|-------------|--|-----|
| CHAPTER - 1 | INTRODUCTION TO HIGHER ORDER REDUCTION METHODS | 1   |
| 1.1         | Introduction                                   | 1   |
| 1.2         | Different types of Reducing Methods            | 2   |
| 1.3         | Mixed Reducing Method                          | 3   |
| 1.3.1       | Padé Approximation                             | 3   |
| 1.3.2       | Diagrams                                       | 4   |
| 1.4         | General Fraction Method                        | 5   |
| 1.4.1       | Substituting Values                            | 5   |
| 1.4.2       | Example  | 6   |
| 1.4.3       | Generalized Padé Approximation                 | 7   |
| 1.4.4       | Example  | 8   |
| 1.4.5       | Example  | 9   |
| 1.4.6       | Example  | 10  |
| 1.4.7       | Example  | 11  |
| 1.4.8       | Example  | 12  |
| 1.4.9       | Example  | 13  |
| 1.4.10      | Example  | 14  |
| 1.4.11      | Example  | 15  |
| 1.4.12      | Example  | 16  |
| 1.4.13      | Example  | 17  |
| 1.4.14      | Example  | 18  |
| 1.4.15      | Example  | 19  |
| 1.4.16      | Example  | 20  |
| 1.4.17      | Example  | 21  |
| 1.4.18      | Example  | 22  |
| 1.4.19      | Example  | 23  |
| 1.4.20      | Example  | 24  |
| 1.4.21      | Example  | 25  |
| 1.4.22      | Example  | 26  |
| 1.4.23      | Example  | 27  |
| 1.4.24      | Example  | 28  |
| 1.4.25      | Example  | 29  |
| 1.4.26      | Example  | 30  |
| 1.4.27      | Example  | 31  |
| 1.4.28      | Example  | 32  |
| 1.4.29      | Example  | 33  |
| 1.4.30      | Example  | 34  |
| 1.4.31      | Example  | 35  |
| 1.4.32      | Example  | 36  |
| 1.4.33      | Example  | 37  |
| 1.4.34      | Example  | 38  |
| 1.4.35      | Example  | 39  |
| 1.4.36      | Example  | 40  |
| 1.4.37      | Example  | 41  |
| 1.4.38      | Example  | 42  |
| 1.4.39      | Example  | 43  |
| 1.4.40      | Example  | 44  |
| 1.4.41      | Example  | 45  |
| 1.4.42      | Example  | 46  |
| 1.4.43      | Example  | 47  |
| 1.4.44      | Example  | 48  |
| 1.4.45      | Example  | 49  |
| 1.4.46      | Example  | 50  |
| 1.4.47      | Example  | 51  |
| 1.4.48      | Example  | 52  |
| 1.4.49      | Example  | 53  |
| 1.4.50      | Example  | 54  |
| 1.4.51      | Example  | 55  |
| 1.4.52      | Example  | 56  |
| 1.4.53      | Example  | 57  |
| 1.4.54      | Example  | 58  |
| 1.4.55      | Example  | 59  |
| 1.4.56      | Example  | 60  |
| 1.4.57      | Example  | 61  |
| 1.4.58      | Example  | 62  |
| 1.4.59      | Example  | 63  |
| 1.4.60      | Example  | 64  |
| 1.4.61      | Example  | 65  |
| 1.4.62      | Example  | 66  |
| 1.4.63      | Example  | 67  |
| 1.4.64      | Example  | 68  |
| 1.4.65      | Example  | 69  |
| 1.4.66      | Example  | 70  |
| 1.4.67      | Example  | 71  |
| 1.4.68      | Example  | 72  |
| 1.4.69      | Example  | 73  |
| 1.4.70      | Example  | 74  |
| 1.4.71      | Example  | 75  |
| 1.4.72      | Example  | 76  |
| 1.4.73      | Example  | 77  |
| 1.4.74      | Example  | 78  |
| 1.4.75      | Example  | 79  |
| 1.4.76      | Example  | 80  |
| 1.4.77      | Example  | 81  |
| 1.4.78      | Example  | 82  |
| 1.4.79      | Example  | 83  |
| 1.4.80      | Example  | 84  |
| 1.4.81      | Example  | 85  |
| 1.4.82      | Example  | 86  |
| 1.4.83      | Example  | 87  |
| 1.4.84      | Example  | 88  |
| 1.4.85      | Example  | 89  |
| 1.4.86      | Example  | 90  |
| 1.4.87      | Example  | 91  |
| 1.4.88      | Example  | 92  |
| 1.4.89      | Example  | 93  |
| 1.4.90      | Example  | 94  |
| 1.4.91      | Example  | 95  |
| 1.4.92      | Example  | 96  |
| 1.4.93      | Example  | 97  |
| 1.4.94      | Example  | 98  |
| 1.4.95      | Example  | 99  |
| 1.4.96      | Example  | 100 |