

วิธีสกรีนทรานสดูรีเลชันสำหรับไอเคนติฟิเคชันระบบลิเนียร์

โดยไซคิจิตัลคอมพิวเตอร์



นายไชนันท์ บุรณะอนุสรณ์

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิศวกรรมศาสตรมหาบัณฑิต

แผนกวิชาวิศวกรรมไฟฟ้า

บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย

พ.ศ. 2517

000728

I15548041

DISCRETE CROSS-CORRELATION METHOD USING DIGITAL COMPUTER

IN LINEAR SYSTEM IDENTIFICATION

Mr. Chainan Burananusorn

A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Engineering
Department of Electrical Engineering
Graduate School
Chulalongkorn University
1974

วิทยาลัยพยาบาลบรมราชชนนีกาญจนบุรี
ศูนย์เทคโนโลยีวิทยาศาสตร์สุขภาพ
ของกรมการศึกษานอกโรงเรียนจังหวัดกาญจนบุรี



.....
.....

คณะผู้บริหารวิทยาลัย

คณะกรรมการตรวจวิทยานิพนธ์

.....
.....

..... กรรมการ

..... กรรมการ

อาจารย์ผู้ควบคุมการวิจัย ดร. เตียนชัย ประสิทธิ์ถาวร

ACKNOWLEDGEMENTS

The author wishes to express his deepest gratitude to his advisor, Dr. Tienchai Pradisthayon, for his valuable assistance, encouragement, suggestions and guidance throughout the course of this study.

Sincere thanks are due to Dr. Tongchat Hongladaromp, for his allowance to use the CDC 3600 digital computer, and to AIT computer staffs for their help.

CONTENTS

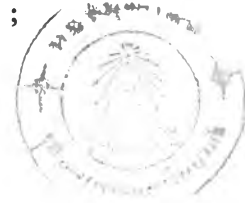
	PAGE
Abstract in Thai	ii
Abstract in English	iii
Acknowledgements	iv
Contents	v
List of Figures	vi
List of Symbols	vii
 Chapter	
I INTRODUCTION	1
II LINEAR SYSTEM IDENTIFICATION BY CROSS-CORRELATION	
TECHNIQUE	4
III ERRORS IN SYSTEM IDENTIFICATION	18
IV DIGITAL COMPUTER PROGRAMS FOR DETERMINATION OF	
THE IMPULSE RESPONSE	30
V SUMMARY	37
 References	 41
Appendixs	43
Vita	92

LIST OF FIGURES

FIGURE	TITLE	PAGE
1	A b.m.l.s. with the period of 15 bits	5
2	Continuous autocorrelation function of b.m.l.s. illustrated in Fig. 1	6
3	Discrete autocorrelation function of b.m.l.s.	6
4	Intermediate value discrete form of autocorrelation function of b.m.l.s.	7
5	The autocorrelation function of b.m.l.s. satisfying Eqn. (11) when m approaches infinity	8
6	A practical experimental process	18
7	A typical waveform of $x(t)$ and the corresponding waveform of $\bar{x}(t)$	22
8	Sampling points of $x(t)$, $g(t)$ and $y(t)$ used in the subroutine CONV	31
9	Sampling points of $x(t)$, $y(t)$ and $\phi_{xy}(t)$ used in the subroutine CORR	33
10	Intermediate value discrete form of $\delta_r(t)$	43

List of Symbols

- b.m.l.s. = pseudo-random binary maximum length sequence;
- n = number of stages of the shift register;
- N = number of bits in one period of b.m.l.s.;
- a = amplitude of b.m.l.s.;
- Δt = time-bit interval of b.m.l.s.;
- Δ = dummy time interval;
- m = number of sub-intervals in time-bit interval;
- T = time period of b.m.l.s., $N\Delta t$;
- $x(t)$ = system input signal and b.m.l.s. whose two states are $+a$ and $-a$;
- $\bar{x}(t)$ = b.m.l.s. whose two states are $+a$ and 0 ;
- $y(t)$ = system output signal;
- $g(t)$ = system impulse response function;
- $g_e(t)$ = system impulse response function including the error due to the drivative terms;
- $\phi_{xx}(t)$ = autocorrelation function of $x(t)$;
- $\phi_{x\bar{x}}(t)$ = cross-correlation function between $x(t)$ and $\bar{x}(t)$;
- $\phi_{\bar{x}y}(t)$ = cross-correlation function between $\bar{x}(t)$ and $y(t)$;
- $\phi_{xy}(t)$ = cross-correlation function between $x(t)$ and $y(t)$;
- $u(t)$ = unit step function;
- $\delta_r(t)$ = unit rectangular pulse function;
- $\delta_c(t)$ = discrete representation of the unit triangular pulse function;
- $S(t)$ = step response function;
- $K(t)$ = dummy function;



A = system steady state gain;

A_k = coefficient of the k th. derivative term of $g(t)$;

d_j = coefficient of time function order j in output polynomial drift;

c = d.c. bias in the b.m.l.s. input signal.

t, τ , s, v = time dummy variables;

i, j, k, l, r = integer variables

$K_g, \lambda, \mu, A, B, C, D, E, F$ = constants

