T.C.
SELÇUK ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ

İNDİRGENMİŞ DİFERANSİYEL DÖNÜŞÜM YÖNTEMİ

Yıldıray KESKİN

DOKTORA TEZİ

Matematik Anabilim Dalı

Aralık - 2010

KONYA

TEZ KABUL VE ONAYI

Yıldıray KESKİN tarafından hazırlanan ''*İNDİRGENMİŞ DİFERANSİYEL DÖNÜŞÜM YÖNTEMİ*'' adlıtez çalışması23/12/2010 tarihinde aşağıdaki jüri tarafından oy birliği / oy çokluğu ile Selçuk Üniversitesi Fen Bilimleri Enstitüsü Matematik Anabilim Dalı'nda DOKTORA TEZİ olarak kabul edilmiştir.

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Yukarıdaki sonucu onaylarım.

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Bu tez çalışması?????. tarafından ????. nolu proje ile desteklenmiştir.

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Bu tezdeki bütün bilgilerin etik davranış ve akademik kurallar çerçevesinde elde edildiğini ve tez yazım kurallarına uygun olarak hazırlanan bu çalışmada bana ait olmayan her türlü ifade ve bilginin kaynağına eksiksiz atıf yapıldığınıbildiririm.

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Tarih: 15/11/2010

ÖZET

DOKTORA TEZİ

İNDİRGENMİŞ DİFERANSİYEL DÖNÜŞÜM YÖNTEMİ

Yıldıray KESKİN

Selçuk Üniversitesi Fen Bilimleri Enstitüsü
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2010, ... Sayfa

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Özet metnini yazmaya buradan başlayınız.

Anahtar Kelimeler: 4-8 adet anahtar kelime yazınız. Alfabetik sırada ve10 punto olmalı

ABSTRACT

Ms Ph.D TEZİ

REDUCED DIFFERENTIAL TRANSFORM METHOD

Yıldıray KESKİN

THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCE OF SELÇUK UNIVERSITY

THE DEGREE OF MASTER OF SCIENCE / DOCTOR OF PHILOSOPHY IN MATHEMATICS

Advisor: Title UnvanıAdıSOYADI

Year, ? Pages

Jury
Advisor Danışmanın UnvanıAdıSOYADI
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Türkçe özet metninin İngilizce’sini yazmaya buradan başlayınız.

Anahtar Kelimeler: Türkçe özetteki anahtar kelimelerin İngilizce?sini yazınız. Alfabetik sırada ve 10 punto olmalı

ÖNSÖZ

Önsöz metnini yazım kılavuzuna uygun olarak yazmaya buradan başlayınız.

Yıldıray KESKİN

KONYA-2010

TEŞEKKÜR

Teşekkür metnini yazım kılavuzuna uygun olarak yazmaya buradan başlayınız.

İÇİNDEKİLER

ŞEKİLLER LİSTESİ

Şekil **Sayfa**

TABLOLAR LİSTESİ

SİMGELER VE KISALTMALAR

Simgeler

Simgeleri yazmaya buradan başlayınız ve yazım kılavuzunda belirtildiği şekilde düzenleyiniz. Simgelerin bitiminden sonra, kısaltmalar başlığından önce bir satır boşluk bırakınız.

Kısaltmalar

Kısaltmalarıyazmaya buradan başlayınız ve yazım kılavuzunda belirtildiği şekilde düzenleyiniz.

1. INTRODUCTION

The University Course Timetabling Problem (UCTP) is a common problem that almost every university has to solve (Shih ve Liu (1991)). ...other timetabling problems described in the literature such as examination timetabling, school timetabling, employee timetabling, and others as stated by Liu ve dig. (1994). All these problems share similar characteristics and they are similarly difficult to solve. The general university course timetabling problem is known to be NP-hard, as many of the subproblems are associated with additional constraints.

$$\sum c_i f_i < \text{available resource} \tag{1.1}$$

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Şekil 1.1. Three dimensional plot for the timetabling problem.

1.1. Thesis' Aim and Objectives

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1.2. Organization of Thesis

The organization of this thesis is as below:

Chapter 1 gives an introduction. Section 1.1 Chapter 2

2. TIMETABLING

The equivalent formulation of this definition based on the conflict matrix instead of on the curricula. The conflict matrix $C_{q \times q}$ is a binary matrix such that $c_{ij} = 1$ if courses K_i and K_j have common students, and $c_{ij} = 0$ otherwise. Shih ve Liu (1991) and Liu ve dig. (1994) define the course timetabling problem by including the objective function given in Equation (2.1).

...

This is demonstrated in Şekil 2.1.

Teorem 2.1 *Let f be a function whose derivative exists in every point, then f is a continuous function.*

Teorem 2.2 (Pythagorean theorem) *This is a theorema about right triangles and can be summarised in the next equation*

$$x^2 + y^2 = z^2$$

And a consequence of theorem 2.2 is the statement in the next corollary.

Sonuç 2.1 *There's no right rectangle whose sides measure 3cm, 4cm, and 6cm.*

You can reference theorems such as Teorem 2.2 when a label is assigned.

Lemma 2.1 *Given two line segments whose lengths are a and b respectively there is a real number r such that $b = ra$. Sonuç 2.1*

İspat To prove it by contradiction try and assume that the statemenet is false, proceed from there and at some point you will arrive to a contradiction.

Örnek 2.1 *To prove it by contradiction try and assume that the statemenet is false, proceed from there and at some point you will arrive to a contradiction.*

Tanım 2.1 *To prove it by contradiction try and assume that the statemenet is false, proceed from there and at some point you will arrive to a contradiction.*

Not 2.1 *This statement is true, I guess.*

$$f(y) = \sum \{d_{ik} y_{ik} \mid i = 1, \ldots, q; k = 1, \ldots, p\} \tag{2.1}$$

Şekil 2.1. Three dimensional plot for the timetabling problem.

2.1. Simulated Annealing

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2.1.1. Neighborhood Searching

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2.1.1.1. Simple Search

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2.1.1.2. Swapping

The work of this dissertation encompasses the following topics:

1. 20 kW Three-Phase, Zero-Current-Switch (ZCS) Resonant Rectifier.
   - Redesign of the input filter for higher voltage ($600V$) and current ($40A$) stresses. A damping network is also added to the input filter.
   - Series connection of input bridge diodes to accommodate higher voltage (2000V) stresses.
   - Redesign of tank diodes and transistor (IGBT, insulated-gate-bipolar transistor) for higher voltage ($1400V$) and current ($200A$) stresses.
   - Design of the control circuit providing constant DC output voltage (e.g., 360 V) at variable AC input voltage (e.g., 300 V_{L-L} to 600 V_{L-L})
   - Mounting of rectifier components within a steel cabinet, and solution of EMI (electromagnetic interference) problems.
   - Debugging of the rectifier to deliver, at rated inputs, the rated output quantities.
2. 30 kVA Three-Phase Current-Controlled PWM Inverter.
   - Employment of a three-phase transformer between inverter and power system.
   - Debugging of the phase-lock-loop and gating circuits and to improve their operating stability.
   - Addition of a harmonic tuned filter at the point of common coupling (PCC) to reduce the high frequency harmonic current flowing into the power system and to obtain a sinusoidal voltage waveform at the output of inverter before connecting it to the power system.

- Before connecting to the utility system, the required AC sinusoidal output voltage ($260V_{L-L}$ AC) for a given DC input voltage (340V DC) can be obtained by operating the PWM inverter with a modulation index greater than 1 ($m > 1$) – independent of the operating point of the inverter. This operating mode is novel: it improves the sinusoidal wave shape of the inverter output voltage and current, reduces switching losses, and reduces the input DC voltage required when compared to PWM with $m < 1$.
- Introduction of a phase-shifting input transformer, to make the displacement power factor of the inverter adjustable.
- Mounting the inverter components within a steel cabinet and to remove parasitic EMI problems.
- Establishing control surfaces for apparent power S and real power P as a function of the reference-current signal $V_{I_{ref}}$ varying between 0.9V and 7V.
- The real and reactive power flow generated by the PWM inverter and fed into the utility system is investigated using fundamental and harmonic phasor analyses.

3. Joint operation of the ZCS rectifier and the PWM inverter – mounted in steel cabinets – delivering rated power to the utility system.

4. Conceptual design of a Transversal Flux Machine (either motor or generator), providing high torques (5 kNm to 2.5 kNm) at low speeds (60 rpm to 120 rpm) based on alternating magnetic field theory. The work of **?** has been extended and two invention disclosures have been submitted **?**.

5. In a circuit where the load is nonlinear or the source has nonsinusoidal quantities, the apparent power is not simply $S = \sqrt{P^2 + Q^2}$: another type of power called distortion power (D) is generated by the cross products of voltage and current harmonics of different frequencies. For nonsinusoidal voltages and currents the apparent power is defined as $S = \sqrt{P^2 + Q^2 + D^2}$. This additional power D increases the load current (apparent power S gets larger) and causes additional losses. Past definitions of the distortion power are reviewed and most are found not to be correct either from a numerical or physical point

of view. A proper formulation is derived for the computation of D from the individual voltage and current harmonics not containing voltages and currents of the same frequency. Experiments are performed to measure the distortion power for a variety of load conditions, i.e., for different THD_i and THD_v values.

6. Measurement of losses of inductors employed in different parts of the drive system, using two different approaches. Two methods for measuring losses of inductors at frequencies from 0 to $6kHz$ are discussed; the first involves the use of sampled inductor voltage and current wave forms through an A/D converter and a computer. The second, called three-voltmeter method, consists of recording the rms values of three sinusoidal voltages. Error analyses of the two approaches are presented.

7. Measurement of the derating of single-phase transformers operating at non-sinusoidal voltage and current wave forms, and comparison of the measured derating values with those obtained from K-factor and harmonic-loss factor (F_{HL}) approaches.

2.1.1.3. Simple Search and Swapping

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2.1.2. Cooling Function

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3. EXPERIMENTAL RESULTS

Generation of electricity from wind has been increasing steadily (about 10%) with the installation of new wind farms each year. However, installed capacity of wind farms is still low ($7GW$) compared to the total installed ($700GW$) power capacity in the United States. Wind farms consist of a great number (typically hundreds) of small ($100kW$ to $1MW$) wind turbines operating at constant speed ($30rpm$). Use of variable speed enables the wind turbine to operate more energy-efficient at different wind speeds; therefore, somewhat more energy can be extracted from the wind. It is desirable to increase the power rating of an individual wind turbine so that larger amounts of power can be generated by one unit. One of the problems associated with increasing power of one unit is the increase of weight (generator and gear box) on the tower.

- This problem may partially be solved by employing a transverse-flux type generator which offers a light weight for high torques at low speeds, therefore, more work should be done to completely study the transversal-flux type machines for such an application.
- Since the variable-speed type system employs expensive power semiconductor devices, a cost analysis should be performed to determine the effectiveness of this type of drive system and rectifier; inverter and machine efficiencies should be in the range from 98 to 96%.
- High-efficiency converter (rectifier/inverter) losses should be measured with small maximum errors (3%).

Tablo 3.1. The effect of N_{move} on Costs and Execution times.

N_{move}	10	50	100	500	1000	3000
Execution time (sec)	0.8	3	6	29	60	154
Cost	2018800	4100	3500	3300	3400	3300

Tablo 3.2. Costs and execution times with the combinations of SN, SWN and S^3WN algorithms algorithmsalgorithms.

SSN and SWN		SSN and S^{3}WN		SWN and S^{3}WN	
Cost	CPU(sec)	Cost	CPU(sec)	Cost	CPU(sec)
3900	28	4900	27	3700	31

In the rest of the tables, we use N_{move} = 500 since it gives the most satisfactory results in terms of the final cost and execution time. Three different neighborhood searching algorithms are demonstrated. First, Table 3.2 ...

KAYNAKLAR

Liu, J., Shih, W.-K., Lin, K.-J., Bettati, R., ve Chung, J.-Y. (1994). Imprecise computations. In *Proceedings of IEEE*, volume 82, s. 83–94.

Shih, W. ve Liu, J.-S. (1991). Algorithms for scheduling imprecise computations. *IEEE Transactions on Computers*, 24(5):58–68.

A. FORTRAN PROGRAM FOR FOURIER ANALYSIS

```
implicit complex(c)
c
c       np=number of points (n+1) ; mp=number of harmonics (nh)
c
parameter (np=82, mp=19)
c
real func(np),mt(np),fx(np),fxc(np),fxs(np),t(np)
real har(mp),phase(mp),norm(mp),fav(mp),fbv(mp)
common /fourier/ fk1,fk2,fk3,a1,a2,nt
common /trapez/ pi, n
open(unit=5,file='i21397-8.txt',status='unknown')
open(unit=11,file='fout.txt',status='unknown')
c
c  n=number of data points(0 to n) in one period (0-2pi)
c  nh=numberf of harmonics,  sca=scale factor, dc=dc offset
c
nt=np
n=nt-1
nh=mp
sca=50./17.5
om=377.
pi=4.*atan(1.)
c
c       coefficients for fourier analysis
c
p=sqrt(0.6)
a1=5./9.
a2=8./9.
fk1=0.5*p*(1.+p)
fk2=(1.+p)*(1.-p)
fk3=0.5*p*(p-1.)
c
c       set up the time axis 0-2pi
c
d=2.*pi/(nt-1)
t1=-d
do 10 i=1,nt
t1=t1+d
10      t(i)=t1
c
c       reading input file(contains one set of data)
c       and writing the scaled data on file fort.20
c
read(5,*)(func(i),i=1,nt)
dc=func(1)
do 21 i=1,nt
mt(i)=(func(i)-dc)*sca
21      write(20,*)t(i),mt(i)
c
c       mt=time domain input (0-2pi), av=average value of mt
```

```
c       rms=rms value of mt
c
call trap(mt,av,rms)
c
print*,'dc component from trapezoidal=', av
print*,'rms value from trapezoidal=', rms
c
c       mt=time domain input, fav,fbv = fourier coefficients
c
call harm(mt,nh,fav,fbv,dcoff,t)
c
ht=0.0
fsq=0.0
do 30 j=1,nh
har(j)=sqrt(fav(j)**2 + fbv(j)**2)
if (fbv(j).eq.0.0) then
phase(j)=0.0
else
phase(j)=atan(fav(j)/fbv(j))
end if
if (fbv(j).lt.0.00) phase(j)=phase(j)+pi
if (j.eq.1) then
hfund=har(j)
else
ht=ht + har(j)**2
endif
norm(j)=har(j)/hfund*100
fsq=fsq + (har(j)/sqrt(2.))**2
30      continue
thd=sqrt(ht)/hfund*100
frms=sqrt(fsq)
cc
write(11,*)'************************************'
write(11,*)'dc component=',dcoff
write(11,*)'dc component from trapezoidal=', av
write(11,*)'rms value from trapezoidal=', rms
write(11,*)'----------------------'
write(11,*)
write(11,1)
1       format(7x,1hh,5x,9hamplitude,4x,
&        7hnorm(%),5x,10hphase(deg),/)
do 40 j=1,nh
40      write(11,2)j,har(j),norm(j),phase(j)*180/pi
2       format(6x,i3,4x,e11.5,2x,f10.6,2x,f10.6,2x,f10.6)
write(11,*)'**********************************'
write(11,*)'total harmonic distortion =',thd,'%'
write(11,*)'rms value of the waveform =',frms
write(11,*)'rms of the fundamental =',hfund/sqrt(2.)
write(6,*)'total harmonic distortion =',thd,'%'
write(6,*)'rms value of the waveform =',frms
write(6,*)'rms of the fundamental =',hfund/sqrt(2.)
c
c       construct original function from fourier coefficients
c       and write result to file fort.21
c
do 55 i=1,nt
fx(i)=0.0
do 56 j=1,nh
h=float(j)
fxc(i)=fav(j)*cos(h*t(i))
```

```
fxs(i)=fbv(j)*sin(h*t(i))
c                write(12,*)h,fav(j),fxc(i),fxs(i)
fx(i)=fx(i)+fxc(i)+fxs(i)
56           continue
55      continue
c       do 58 i=1,nt
c58     write(21,*)t(i),fx(i)
c
stop
end

c       work: time domain input
c       tt: time axis input
c       dcc: computed dc offset of work (output)
c       idh: number of harmonics input
c       avc,bvc: fourier coefficients (output)

subroutine harm(work,idh,avc,bvc,dcc,tt)
implicit complex(c)
tp=b-a
sum=0.0
do 90 i=2,n
sum=sum+f(i)
90      continue
fave=(1/tp)*0.5*h*(f(1)+f(n+1)+2*sum)
do 91 i=1,n+1
91      fkare(i)=f(i)**2
rsum=0.0
do 92 i=2,n
92      rsum=rsum+fkare(i)
rint=(1/tp)*0.5*h*(fkare(1)+fkare(n+1)+2*rsum)
frms=sqrt(rint)
return
end
```

B. SOFTWARE FOR SIMULATED ANNEALING

Etiam euismod. Fusce facilisis lacinia dui. Suspendisse potenti. In mi erat, cursus id, nonummy sed, ullamcorper eget, sapien. Praesent pretium, magna in eleifend egestas, pede pede pretium lorem, quis consectetuer tortor sapien facilisis magna. Mauris quis magna varius nulla scelerisque imperdiet. Aliquam non quam. Aliquam porttitor quam a lacus. Praesent vel arcu ut tortor cursus volutpat. In vitae pede quis diam bibendum placerat. Fusce elementum convallis neque. Sed dolor orci, scelerisque ac, dapibus nec, ultricies ut, mi. Duis nec dui quis leo sagittis commodo.

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ÖZGEÇMİŞ

KİŞİSEL BİLGİLER

AdıSoyadı:

Uyruğu :

Doğum Yeri ve Tarihi :

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Faks :

e-mail :

EĞİTİM

Derece	**Adı, İlçe, İl**	**Bitirme Yılı**
Lise	1	2
Yüksek Lisans	3	4
Doktora	5	6

İŞ DENEYİMLERİ

Yıl	**Kurum**	**Görevi**
1	2	3
4	5	6

UZMANLIK ALANI

Matematik, Sayılar Teorisi

YABANCI DİLLER

YDS (72.5)

BELİRTMEK İSTEDİĞİNİZ DİĞER ÖZELLİKLER

İleri Düzey Matlab Bilgisi

YAYINLAR

Yayınlarınızıburaya yazabilirsiniz