

## BAB V

### KESIMPULAN DAN SARAN

#### 5.1. Kesimpulan

Setelah melalui hasil analisis dan pembahasan yang telah dilakukan sebelumnya, maka dapat diperoleh beberapa kesimpulan sebagai berikut :

1. Hasil identifikasi parameter modal dengan menggunakan metode analisis numerik yang dikembangkan oleh Arfiadi (1996) pada struktur *frame*, frekuensi alami struktur ( $\omega_n$ ) yang didapatkan untuk masing-masing lantai = 0,69; 2,04; 3,21; 4,12; 4,70 rad/s dan periode getar ( $T$ ) yang didapatkan masing-masing lantai = 9,02; 3,09; 1,96; 1,53; 1,34 second sedangkan pada struktur balok sederhana frekuensi alami struktur ( $\omega_n$ ) didapatkan = 8,33 rad/s dan periode getar ( $T$ ) yang didapatkan = 0,75 second.
2. Hasil identifikasi parameter modal dengan menggunakan metode FDD dengan menggunakan program yang dikembangkan oleh Schanke (2015) pada struktur *frame* yaitu frekuensi alami struktur ( $\omega_n$ ) yang didapatkan untuk masing-masing lantai = 0,69; 1,99; 3,22; 4,14; 4,68 rad/s dan periode getar ( $T$ ) untuk masing – masing lantai = 9,11; 3,15; 1,95; 1,52; 1,34 second sedangkan pada struktur balok sederhana frekuensi alami struktur ( $\omega_n$ ) yang didapatkan = 8,28 rad/s dan periode getar ( $T$ ) = 0,76 second.
3. Perbandingan hasil identifikasi parameter modal antara metode analisis numerik dan metode FDD yaitu untuk frekuensi alami struktur ( $\omega_n$ ) untuk masing-masing lantai = 1; 2,05; 0,41; 0,49; 0,47 %. Sedangkan pada struktur balok sederhana

sebesar 0,56 %. Untuk Periode getar ( $T$ ) untuk masing-masing lantai = 1; 2,01; 0,42; 0,49; 0,47 %. Sedangkan pada struktur balok sederhana sebesar 0,53 %. Hasil perbandingan ini mengindikasikan bahwa metode FDD yang dikembangkan oleh Brincker, dkk (2000) dengan bantuan *software* - Matlab dapat digunakan sebagai salah satu metode untuk mengidentifikasi parameter modal struktur, karena rasio perbandingan masih dibawah 10% sehingga data yang dihasilkan tergolong cukup akurat.

## 5.2. Saran

Melalui hasil penelitian ini maka disarankan :

1. Perlu dilakukan penelitian terhadap model struktur dan material yang berbeda,
2. Perlu dilakuakan penelitian dengan metode identifikasi yang berbeda sebagai pembanding
3. Perlu dilakukan penelitian lanjutan tentang identifikasi kerusakan struktur dan atau monitoring kesehatan struktur dengan memanfaatkan analisis parameter modal seperti yang dilakukan pada penelitian ini.

## DAFTAR PUSTAKA

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LAMPIRAN 1 (SATU)  
INPUT DAN OUTPUT - MATLAB  
PADA STRUKTUR FRAME  
( ANALISIS NUMERIK )

INPUT DATA MATLAB  
PADA MODEL STRUKTUR FRAME

```

M=[5 0 0 0 0
    0 5 0 0 0
    0 0 5 0 0
    0 0 0 5 0
    0 0 0 0 5]
eo=[-5;-5;-5;-5;-5]

K=[60 -30 0 0 0
   -30 60 -30 0 0
    0 -30 60 -30 0
    0 0 -30 60 -30
    0 0 0 -30 30]

n=size(K)
n=n(1)  %--ukuran DOF atau n=5
N=2*n  %--ukuran state vector

C=[0.2 -0.1 0 0 0
   -0.1 0.2 -0.1 0 0
    0 -0.1 0.2 -0.1 0
    0 0 -0.1 0.2 -0.1
    0 0 0 -0.1 0.1]

[eigv,eigval]=eig(M\K)
[wo,worder]=sort(sqrt(diag(eigval)))
for i = 1:5
    mode(:,i)=eigv(:,i)/eigv(1,i)
end
mode5=[mode(5,5);mode(4,5);mode(3,5);mode(2,5);mode(1,5)]
mode4=[mode(5,4);mode(4,4);mode(3,4);mode(2,4);mode(1,4)]
mode3=[mode(5,3);mode(4,3);mode(3,3);mode(2,3);mode(1,3)]
mode2=[mode(5,2);mode(4,2);mode(3,2);mode(2,2);mode(1,2)]
mode1=[mode(5,1);mode(4,1);mode(3,1);mode(2,1);mode(1,1)]

%--State space Eq
A=[zeros(n,n) eye(n);-inv(M)*K -inv(M)*C]
E=[zeros(n,1);inv(M)*eo]

%--Y=X
Cy=eye(N)
Dy=zeros(N,1)

syst1=ss(A,E,Cy,Dy);

t1=0:0.01:1000;
iu1=randn(1,length(t1))';

[y1,t1,z1]=lsim(syst1,iu1,t1);    %%simulasi
plot(t1,y1)
plot(t1,y1(:,1),'-k')    %% plot perpindahan lantai 1 dan 2
xlabel('waktu (detik)')

```

```
ylabel('Perpindahan (m)')  
  
y1max=(max(abs(y1(:,1))))  
y2max=(max(abs(y1(:,2))))      %%%---perpindahan max  
  
I0=[1;1;1;1;1]  
acc5lt_terpusat=-[inv(M)*K inv(M)*C]*z1'-I0*iu1';  
  
save acc5lt_terpusat.mat
```



OUTPUT PARAMETER MODAL - MATLAB  
PADA STRUKTUR FRAME

M =

5	0	0	0	0
0	5	0	0	0
0	0	5	0	0
0	0	0	5	0
0	0	0	0	5

eo =

-5  
-5  
-5  
-5  
-5

K =

60	-30	0	0	0
-30	60	-30	0	0
0	-30	60	-30	0
0	0	-30	60	-30
0	0	0	-30	30

n =

5 5

n =

5

N =

10

C =

0.2000	-0.1000	0	0	0
-0.1000	0.2000	-0.1000	0	0
0	-0.1000	0.2000	-0.1000	0
0	0	-0.1000	0.2000	-0.1000
0	0	0	-0.1000	0.1000

eigv =



0.1699	-0.4557	0.5969	0.5485	-0.3260
0.3260	-0.5969	0.1699	-0.4557	0.5485
0.4557	-0.3260	-0.5485	-0.1699	-0.5969
0.5485	0.1699	-0.3260	0.5969	0.4557
0.5969	0.5485	0.4557	-0.3260	-0.1699

eigval =

0.4861	0	0	0	0
0	4.1417	0	0	0
0	0	10.2922	0	0
0	0	0	16.9850	0
0	0	0	0	22.0950

wo =

0.6972  
2.0351  
3.2081  
4.1213  
4.7005

worder =

1  
2  
3  
4  
5

mode =

1.0000  
1.9190  
2.6825  
3.2287  
3.5133

mode =

1.0000	1.0000
1.9190	1.3097
2.6825	0.7154
3.2287	-0.3728
3.5133	-1.2036

mode =

1.0000	1.0000	1.0000
1.9190	1.3097	0.2846

2.6825	0.7154	-0.9190
3.2287	-0.3728	-0.5462
3.5133	-1.2036	0.7635

mode =

1.0000	1.0000	1.0000	1.0000
1.9190	1.3097	0.2846	-0.8308
2.6825	0.7154	-0.9190	-0.3097
3.2287	-0.3728	-0.5462	1.0882
3.5133	-1.2036	0.7635	-0.5944

mode =

1.0000	1.0000	1.0000	1.0000	1.0000
1.9190	1.3097	0.2846	-0.8308	-1.6825
2.6825	0.7154	-0.9190	-0.3097	1.8308
3.2287	-0.3728	-0.5462	1.0882	-1.3979
3.5133	-1.2036	0.7635	-0.5944	0.5211

mode5 =

0.5211  
-1.3979  
1.8308  
-1.6825  
1.0000

mode4 =

-0.5944  
1.0882  
-0.3097  
-0.8308  
1.0000

mode3 =

0.7635  
-0.5462  
-0.9190  
0.2846  
1.0000

mode2 =

-1.2036  
-0.3728  
0.7154  
1.3097

1.0000

model =

3.5133  
3.2287  
2.6825  
1.9190  
1.0000

A =

0	0	0	0	0	1.0000	0	0	0	0
0	0	0	0	0	0	1.0000	0	0	0
0	0	0	0	0	0	0	1.0000	0	0
0	0	0	0	0	0	0	0	1.0000	0
0	0	0	0	0	0	0	0	0	1.0000
-12.0000	6.0000	0	0	0	-0.0400	0.0200	0	0	0
6.0000	-12.0000	6.0000	0	0	0.0200	-0.0400	0.0200	0	0
0	6.0000	-12.0000	6.0000	0	0	0.0200	-0.0400	-0.0200	0
0	0	6.0000	-12.0000	6.0000	0	0	0.0200	-0.0400	-0.0200
0	0	0	6.0000	-6.0000	0	0	0	0.0200	-0.0200

E =

0  
0  
0  
0  
0  
0  
-1  
-1  
-1  
-1  
-1

Cy =

1	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	0	0	0	1

Dy =

0  
0  
0  
0

```
0
0
0
0
0
0
```

```
y1max =
```

```
1.4396
```

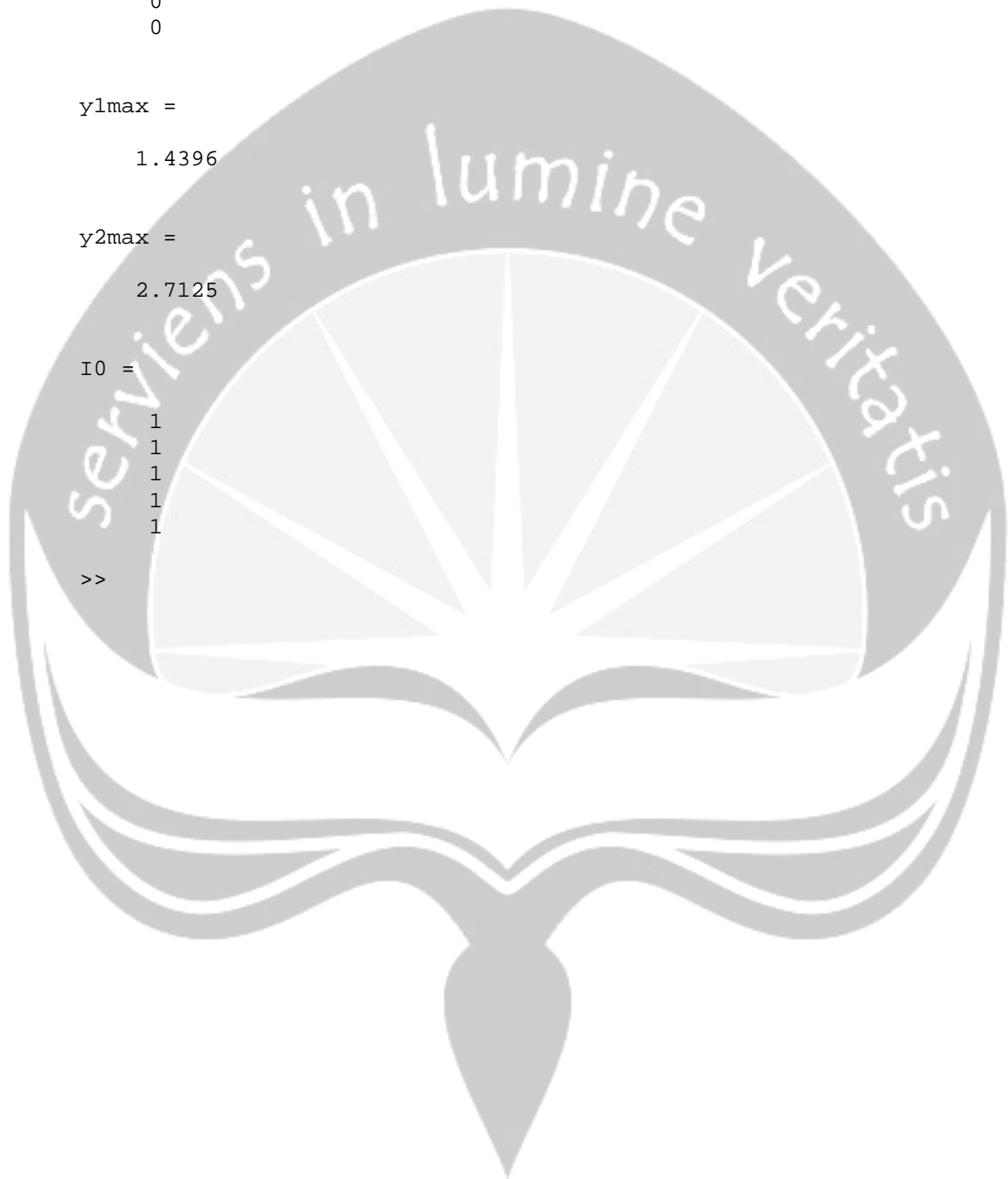
```
y2max =
```

```
2.7125
```

```
I0 =
```

```
1
1
1
1
1
1
```

```
>>
```





LAMPIRAN 2 (DUA)  
INPUT DAN OUTPUT – MATLAB  
PADA STRUKTUR BALOK SEDERHANA  
(ANALISIS NUMERIK)

INPUT DATA MATLAB  
PADA STRUKTUR BALOK SEDERHANA

```

clc
clear all

n1=coor(0,0)    %---data koordinat
n2=coor(0.5,0)
n3=coor(1,0)

E=2e8           %---kN/m2
A=0.25*pi*0.008^2 %---m2
rho=7850        %---kg/m3

[L1,T1]=memf(n1,n2) % --- menghitung L1 dan T1
I1=(pi*(0.008^4))/64
k1=klf(E,A,I1,L1) % --- membentuk k lokal
K1=kg(k1,T1)      % --- membentuk K global
m1=mlf(rho,A,L1)
M1=mg(m1,T1)
ID1=[0 0 1 2 6 3]

[L2,T2]=memf(n2,n3)
I2=I1
k2=klf(E,A,I2,L2)
K2=kg(k2,T2)
m2=mlf(rho,A,L2)
M2=mg(m2,T2)
ID2=[2 6 3 4 0 5]

dof=6
K=assf(K1,ID1,dof);
K=K+assf(K2,ID2,dof)

M=assf(M1,ID1,dof);
M=M+assf(M2,ID2,dof)

%---input beban dinamik
t1=0:0.01:100;
iu1=randn(1,length(t1))';

nc=5
nv=1
Kver=kcon(K,nc,nv)
Mver=mcon(M,nc,nv)
%%%%%%%%%%%%%%
n=size(Kver)
n=n(1)
N=2*n

eo=[-0.0278]

P=[-iu1];

```

```

[eigv,eigval]=eig(Mver\Kver)
[wo,worder]=sort(sqrt(diag(eigval)))
modeshape=eigv(:,worder)

T=(2*pi)/wo

rd=0.02 %--rasio redaman 2%
ak=rd*T/pi
am=rd*4*pi/T

Ck=ak*Kver %--redaman sebanding kekakuan
Cm=am*Mver %--redaman sebanding massa
C=(ak*Kver)+(am*Mver) %--C Rayleigh

%--State space Eq
A=[zeros(n,n) eye(n);-inv(Mver)*Kver -inv(Mver)*C]
E=[zeros(n,1);inv(Mver)*eo]

%--Y=X
Cy=eye(N)
Dy=zeros(N,1)

syst1=ss(A,E,Cy,Dy);

[y1,t1,z1]=lsim(syst1,P,t1); %%simulasi

I0=[1]
acc_simple_beam=-[inv(Mver)*Kver inv(Mver)*C]*z1'-I0*P';

save acc_simple_beam.mat

```

OUTPUT PARAMETER MODAL - MATLAB  
PADA STRUKTUR BALOK SEDERHANA

```

n1 =
    0    0

n2 =
    0.5000    0

n3 =
    1    0

E =
2000000000

A =
5.0265e-05

rho =
    7850

L1 =
    0.5000

T1 =
    1    0    0    0    0    0
    0    1    0    0    0    0
    0    0    1    0    0    0
    0    0    0    1    0    0
    0    0    0    0    1    0
    0    0    0    0    0    1

I1 =
2.0106e-10

k1 =
1.0e+04 *

    2.0106    0    0   -2.0106    0    0
    0    0.0004    0.0001    0   -0.0004    0.0001
    0    0.0001    0.0000    0   -0.0001    0.0000
   -2.0106    0    0    2.0106    0    0
    0   -0.0004   -0.0001    0    0.0004   -0.0001
    0    0.0001    0.0000    0   -0.0001    0.0000

```



K1 =  
1.0e+04 \*

2.0106	0	0	-2.0106	0	0
0	0.0004	0.0001	0	-0.0004	0.0001
0	0.0001	0.0000	0	-0.0001	0.0000
-2.0106	0	0	2.0106	0	0
0	-0.0004	-0.0001	0	0.0004	-0.0001
0	0.0001	0.0000	0	-0.0001	0.0000

m1 =

0.0658	0	0	0.0329	0	0
0	0.0592	0.0052	0	0.0254	-0.0031
0	0.0052	0.0005	0	0.0031	-0.0004
0.0329	0	0	0.0658	0	0
0	0.0254	0.0031	0	0.0733	-0.0103
0	-0.0031	-0.0004	0	-0.0103	0.0005

M1 =

0.0658	0	0	0.0329	0	0
0	0.0592	0.0052	0	0.0254	-0.0031
0	0.0052	0.0005	0	0.0031	-0.0004
0.0329	0	0	0.0658	0	0
0	0.0254	0.0031	0	0.0733	-0.0103
0	-0.0031	-0.0004	0	-0.0103	0.0005

ID1 =

0	0	1	2	6	3
---	---	---	---	---	---

L2 =  
0.5000

T2 =

1	0	0	0	0	0
0	1	0	0	0	0
0	0	1	0	0	0
0	0	0	1	0	0
0	0	0	0	1	0
0	0	0	0	0	1

I2 =  
2.0106e-10

k2 =  
1.0e+04 \*

2.0106	0	0	-2.0106	0	0
0	0.0004	0.0001	0	-0.0004	0.0001
0	0.0001	0.0000	0	-0.0001	0.0000
-2.0106	0	0	2.0106	0	0
0	-0.0004	-0.0001	0	0.0004	-0.0001
0	0.0001	0.0000	0	-0.0001	0.0000

K2 =  
1.0e+04 \*

2.0106	0	0	-2.0106	0	0
0	0.0004	0.0001	0	-0.0004	0.0001
0	0.0001	0.0000	0	-0.0001	0.0000
-2.0106	0	0	2.0106	0	0
0	-0.0004	-0.0001	0	0.0004	-0.0001
0	0.0001	0.0000	0	-0.0001	0.0000

m2 =

0.0658	0	0	0.0329	0	0
0	0.0592	0.0052	0	0.0254	-0.0031
0	0.0052	0.0005	0	0.0031	-0.0004
0.0329	0	0	0.0658	0	0
0	0.0254	0.0031	0	0.0733	-0.0103
0	-0.0031	-0.0004	0	-0.0103	0.0005

M2 =

0.0658	0	0	0.0329	0	0
0	0.0592	0.0052	0	0.0254	-0.0031
0	0.0052	0.0005	0	0.0031	-0.0004
0.0329	0	0	0.0658	0	0
0	0.0254	0.0031	0	0.0733	-0.0103
0	-0.0031	-0.0004	0	-0.0103	0.0005

ID2 =

2 6 3 4 0 5

dof =

6

K =

1.0e+04 \*

0.0000	0	0.0000	0	0	-0.0001
0	4.0212	0	-2.0106	0	0
0.0000	0	0.0001	0	0.0000	0
0	-2.0106	0	2.0106	0	0
0	0	0.0000	0	0.0000	0.0001
-0.0001	0	0	0	0.0001	0.0008

M =

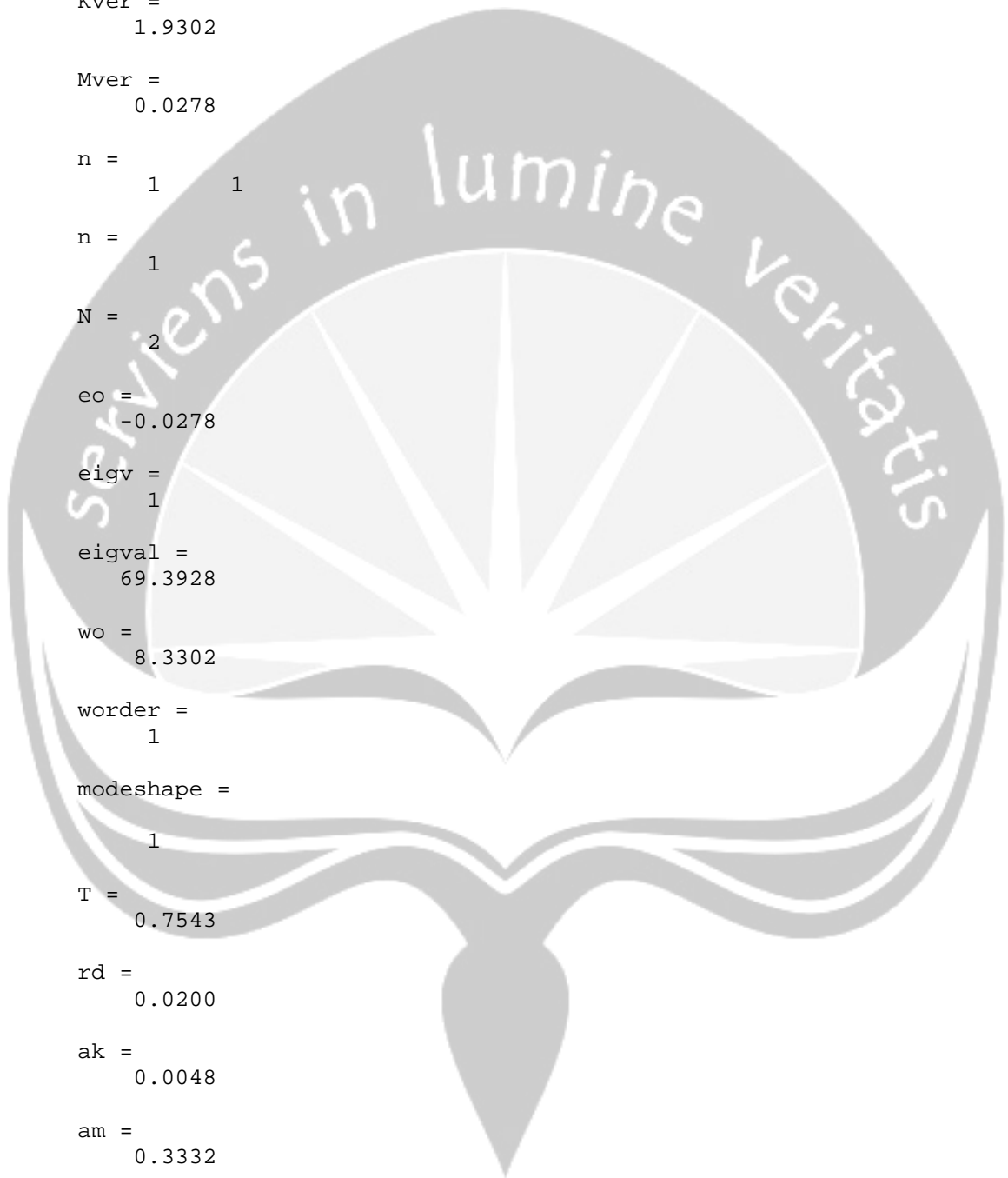
0.0005	0	-0.0004	0	0	0.0031
0	0.1315	0	0.0329	0	0
-0.0004	0	0.0009	0	-0.0004	-0.0052
0	0.0329	0	0.0658	0	0
0	0	-0.0004	0	0.0005	-0.0031
0.0031	0	-0.0052	0	-0.0031	0.1325

nc =

5

nv =

```
1  
  
Kver =  
  1.9302  
  
Mver =  
  0.0278  
  
n =  
  1    1  
  
n =  
  1  
  
N =  
  2  
  
eo =  
-0.0278  
  
eigv =  
  1  
  
eigval =  
 69.3928  
  
wo =  
 8.3302  
  
worder =  
  1  
  
modeshape =  
  1  
  
T =  
 0.7543  
  
rd =  
 0.0200  
  
ak =  
 0.0048  
  
am =  
 0.3332  
  
Ck =  
 0.0093  
  
Cm =  
 0.0093
```



```
C =  
    0.0185
```

```
A =  
      0    1.0000  
-69.3928 -0.6664
```

```
E =  
      0  
-0.9994
```

```
Cy =  
      1    0  
      0    1
```

```
Dy =  
      0  
      0
```

```
IO =  
      1
```

```
>>
```





OUTPUT PARAMETER MODAL - METODE FDD  
PADA STRUKTUR FRAME

NFFT =

8192

>> freq

freq =

Columns 1 through 6	0	0.0767	0.1534	0.2301	0.3068	0.3835
Columns 7 through 12	0.4602	0.5369	0.6136	0.6903	0.7670	0.8437
Columns 13 through 18	0.9204	0.9971	1.0738	1.1505	1.2272	1.3039
Columns 19 through 24	1.3806	1.4573	1.5340	1.6107	1.6874	1.7641
Columns 25 through 30	1.8408	1.9175	1.9942	2.0709	2.1476	2.2243
Columns 31 through 36	2.3010	2.3777	2.4544	2.5311	2.6078	2.6845
Columns 37 through 42	2.7612	2.8379	2.9146	2.9913	3.0680	3.1447
Columns 43 through 48	3.2214	3.2981	3.3748	3.4515	3.5282	3.6049
Columns 49 through 54	3.6816	3.7583	3.8350	3.9117	3.9884	4.0650
Columns 55 through 60	4.1417	4.2184	4.2951	4.3718	4.4485	4.5252
Columns 61 through 66	4.6019	4.6786	4.7553	4.8320	4.9087	4.9854
Columns 67 through 72	5.0621	5.1388	5.2155	5.2922	5.3689	5.4456
Columns 73 through 78	5.5223	5.5990	5.6757	5.7524	5.8291	5.9058
Columns 79 through 84	5.9825	6.0592	6.1359	6.2126	6.2893	6.3660
Columns 85 through 90	6.4427	6.5194	6.5961	6.6728	6.7495	6.8262
Columns 91 through 96	6.9029	6.9796	7.0563	7.1330	7.2097	7.2864
Columns 97 through 102	7.3631	7.4398	7.5165	7.5932	7.6699	7.7466
Columns 103 through 108	7.8233	7.9000	7.9767	8.0534	8.1301	8.2068
Columns 109 through 114	8.2835	8.3602	8.4369	8.5136	8.5903	8.6670
Columns 115 through 120	8.7437	8.8204	8.8971	8.9738	9.0505	9.1272
Columns 121 through 126	9.2039	9.2806	9.3573	9.4340	9.5107	9.5874
Columns 127 through 132						

9.6641	9.7408	9.8175	9.8942	9.9709	10.0476
Columns 133 through	138				
10.1243	10.2010	10.2777	10.3544	10.4311	10.5078
Columns 139 through	144				
10.5845	10.6612	10.7379	10.8146	10.8913	10.9680
Columns 145 through	150				
11.0447	11.1214	11.1981	11.2748	11.3515	11.4282
Columns 151 through	156				
11.5049	11.5816	11.6583	11.7350	11.8117	11.888
Columns 157 through	162				
11.9651	12.0417	12.1184	12.1951	12.2718	12.3485
Columns 163 through	168				
12.4252	12.5019	12.5786	12.6553	12.7320	12.8087
Columns 169 through	174				
12.8854	12.9621	13.0388	13.1155	13.1922	13.2689
Columns 175 through	180				
13.3456	13.4223	13.4990	13.5757	13.6524	13.7291
Columns 181 through	186				
13.8058	13.8825	13.9592	14.0359	14.1126	14.1893
Columns 187 through	192				
14.2660	14.3427	14.4194	14.4961	14.5728	14.6495
Columns 193 through	198				
14.7262	14.8029	14.8796	14.9563	15.0330	15.1097
Columns 199 through	204				
15.1864	15.2631	15.3398	15.4165	15.4932	15.5699
Columns 205 through	210				
15.6466	15.7233	15.8000	15.8767	15.9534	16.0301
Columns 211 through	216				
16.1068	16.1835	16.2602	16.3369	16.4136	16.4903
Columns 217 through	222				
16.5670	16.6437	16.7204	16.7971	16.8738	16.9505
Columns 223 through	228				
17.0272	17.1039	17.1806	17.2573	17.3340	17.4107
Columns 229 through	234				
17.4874	17.5641	17.6408	17.7175	17.7942	17.8709
Columns 235 through	240				
17.9476	18.0243	18.1010	18.1777	18.2544	18.3311
Columns 241 through	246				
18.4078	18.4845	18.5612	18.6379	18.7146	18.7913
Columns 247 through	252				
18.8680	18.9447	19.0214	19.0981	19.1748	19.2515
Columns 253 through	258				
19.3282	19.4049	19.4816	19.5583	19.6350	19.7117
Columns 259 through	264				
19.7884	19.8651	19.9418	20.0184	20.0951	20.1718
Columns 265 through	270				
20.2485	20.3252	20.4019	20.4786	20.5553	20.6320
Columns 271 through	276				
20.7087	20.7854	20.8621	20.9388	21.0155	21.0922
Columns 277 through	282				
21.1689	21.2456	21.3223	21.3990	21.4757	21.5524
Columns 283 through	288				
21.6291	21.7058	21.7825	21.8592	21.9359	22.0126
Columns 289 through	294				
22.0893	22.1660	22.2427	22.3194	22.3961	22.4728
Columns 295 through	300				

22.5495	22.6262	22.7029	22.7796	22.8563	22.9330
Columns 301 through 306					
23.0097	23.0864	23.1631	23.2398	23.3165	23.3932
Columns 307 through 312					
23.4699	23.5466	23.6233	23.7000	23.7767	23.8534
Columns 313 through 318					
23.9301	24.0068	24.0835	24.1602	24.2369	24.3136
Columns 319 through 324					
24.3903	24.4670	24.5437	24.6204	24.6971	24.7738
Columns 325 through 330					
24.8505	24.9272	25.0039	25.0806	25.1573	25.2340
Columns 331 through 336					
25.3107	25.3874	25.4641	25.5408	25.6175	25.6942
Columns 337 through 342					
25.7709	25.8476	25.9243	26.0010	26.0777	26.1544
Columns 343 through 348					
26.2311	26.3078	26.3845	26.4612	26.5379	26.6146
Columns 349 through 354					
26.6913	26.7680	26.8447	26.9214	26.9981	27.0748
Columns 355 through 360					
27.1515	27.2282	27.3049	27.3816	27.4583	27.5350
Columns 361 through 366					
27.6117	27.6884	27.7651	27.8418	27.9185	27.9951
Columns 367 through 372					
28.0718	28.1485	28.2252	28.3019	28.3786	28.4553
Columns 373 through 378					
28.5320	28.6087	28.6854	28.7621	28.8388	28.9155
Columns 379 through 384					
28.9922	29.0689	29.1456	29.2223	29.2990	29.3757
Columns 385 through 390					
29.4524	29.5291	29.6058	29.6825	29.7592	29.8359
Columns 391 through 396					
29.9126	29.9893	30.0660	30.1427	30.2194	30.2961
Columns 397 through 402					
30.3728	30.4495	30.5262	30.6029	30.6796	30.7563
Columns 403 through 408					
30.8330	30.9097	30.9864	31.0631	31.1398	31.2165
Columns 409 through 414					
31.2932	31.3699	31.4466	31.5233	31.6000	31.6767
Columns 415 through 420					
31.7534	31.8301	31.9068	31.9835	32.0602	32.1369
Columns 421 through 426					
32.2136	32.2903	32.3670	32.4437	32.5204	32.5971
Columns 427 through 432					
32.6738	32.7505	32.8272	32.9039	32.9806	33.0573
Columns 433 through 438					
33.1340	33.2107	33.2874	33.3641	33.4408	33.5175
Columns 439 through 444					
33.5942	33.6709	33.7476	33.8243	33.9010	33.9777
Columns 445 through 450					
34.0544	34.1311	34.2078	34.2845	34.3612	34.4379
Columns 451 through 456					
34.5146	34.5913	34.6680	34.7447	34.8214	34.8981
Columns 457 through 462					
34.9748	35.0515	35.1282	35.2049	35.2816	35.3583
Columns 463 through 468					



35.4350	35.5117	35.5884	35.6651	35.7418	35.8185
Columns 469 through 474					
35.8952	35.9718	36.0485	36.1252	36.2019	36.2786
Columns 475 through 480					
36.3553	36.4320	36.5087	36.5854	36.6621	36.7388
Columns 481 through 486					
36.8155	36.8922	36.9689	37.0456	37.1223	37.1990
Columns 487 through 492					
37.2757	37.3524	37.4291	37.5058	37.5825	37.6592
Columns 493 through 498					
37.7359	37.8126	37.8893	37.9660	38.0427	38.1194
Columns 499 through 504					
38.1961	38.2728	38.3495	38.4262	38.5029	38.5796
Columns 505 through 510					
38.6563	38.7330	38.8097	38.8864	38.9631	39.0398
Columns 511 through 516					
39.1165	39.1932	39.2699	39.3466	39.4233	39.5000
Columns 517 through 522					
39.5767	39.6534	39.7301	39.8068	39.8835	39.9602
Columns 523 through 528					
40.0369	40.1136	40.1903	40.2670	40.3437	40.4204
Columns 529 through 534					
40.4971	40.5738	40.6505	40.7272	40.8039	40.8806
Columns 535 through 540					
40.9573	41.0340	41.1107	41.1874	41.2641	41.3408
Columns 541 through 546					
41.4175	41.4942	41.5709	41.6476	41.7243	41.8010
Columns 547 through 552					
41.8777	41.9544	42.0311	42.1078	42.1845	42.2612
Columns 553 through 558					
42.3379	42.4146	42.4913	42.5680	42.6447	42.7214
Columns 559 through 564					
42.7981	42.8748	42.9515	43.0282	43.1049	43.1816
Columns 565 through 570					
43.2583	43.3350	43.4117	43.4884	43.5651	43.6418
Columns 571 through 576					
43.7185	43.7952	43.8719	43.9485	44.0252	44.1019
Columns 577 through 582					
44.1786	44.2553	44.3320	44.4087	44.4854	44.5621
Columns 583 through 588					
44.6388	44.7155	44.7922	44.8689	44.9456	45.0223
Columns 589 through 594					
45.0990	45.1757	45.2524	45.3291	45.4058	45.4825
Columns 595 through 600					
45.5592	45.6359	45.7126	45.7893	45.8660	45.9427
Columns 601 through 606					
46.0194	46.0961	46.1728	46.2495	46.3262	46.4029
Columns 607 through 612					
46.4796	46.5563	46.6330	46.7097	46.7864	46.8631
Columns 613 through 618					
46.9398	47.0165	47.0932	47.1699	47.2466	47.3233
Columns 619 through 624					
47.4000	47.4767	47.5534	47.6301	47.7068	47.7835
Columns 625 through 630					
47.8602	47.9369	48.0136	48.0903	48.1670	48.2437
Columns 631 through 636					

48.3204	48.3971	48.4738	48.5505	48.6272	48.7039
Columns 637 through	642				
48.7806	48.8573	48.9340	49.0107	49.0874	49.1641
Columns 643 through	648				
49.2408	49.3175	49.3942	49.4709	49.5476	49.6243
Columns 649 through	654				
49.7010	49.7777	49.8544	49.9311	50.0078	50.0845
Columns 655 through	660				
50.1612	50.2379	50.3146	50.3913	50.4680	50.5447
Columns 661 through	666				
50.6214	50.6981	50.7748	50.8515	50.9282	51.0049
Columns 667 through	672				
51.0816	51.1583	51.2350	51.3117	51.3884	51.4651
Columns 673 through	678				
51.5418	51.6185	51.6952	51.7719	51.8486	51.9252
Columns 679 through	684				
52.0019	52.0786	52.1553	52.2320	52.3087	52.3854
Columns 685 through	690				
52.4621	52.5388	52.6155	52.6922	52.7689	52.8456
Columns 691 through	696				
52.9223	52.9990	53.0757	53.1524	53.2291	53.3058
Columns 697 through	702				
53.3825	53.4592	53.5359	53.6126	53.6893	53.7660
Columns 703 through	708				
53.8427	53.9194	53.9961	54.0728	54.1495	54.2262
Columns 709 through	714				
54.3029	54.3796	54.4563	54.5330	54.6097	54.6864
Columns 715 through	720				
54.7631	54.8398	54.9165	54.9932	55.0699	55.1466
Columns 721 through	726				
55.2233	55.3000	55.3767	55.4534	55.5301	55.6068
Columns 727 through	732				
55.6835	55.7602	55.8369	55.9136	55.9903	56.0670
Columns 733 through	738				
56.1437	56.2204	56.2971	56.3738	56.4505	56.5272
Columns 739 through	744				
56.6039	56.6806	56.7573	56.8340	56.9107	56.9874
Columns 745 through	750				
57.0641	57.1408	57.2175	57.2942	57.3709	57.4476
Columns 751 through	756				
57.5243	57.6010	57.6777	57.7544	57.8311	57.9078
Columns 757 through	762				
57.9845	58.0612	58.1379	58.2146	58.2913	58.3680
Columns 763 through	768				
58.4447	58.5214	58.5981	58.6748	58.7515	58.8282
Columns 769 through	774				
58.9049	58.9816	59.0583	59.1350	59.2117	59.2884
Columns 775 through	780				
59.3651	59.4418	59.5185	59.5952	59.6719	59.7486
Columns 781 through	786				
59.8253	59.9019	59.9786	60.0553	60.1320	60.2087
Columns 787 through	792				
60.2854	60.3621	60.4388	60.5155	60.5922	60.6689
Columns 793 through	798				
60.7456	60.8223	60.8990	60.9757	61.0524	61.1291
Columns 799 through	804				

61.2058	61.2825	61.3592	61.4359	61.5126	61.5893
Columns 805 through 810	61.6660	61.7427	61.8194	61.8961	61.9728
Columns 811 through 816	62.1262	62.2029	62.2796	62.3563	62.4330
Columns 817 through 822	62.5864	62.6631	62.7398	62.8165	62.8932
Columns 823 through 828	63.0466	63.1233	63.2000	63.2767	63.3534
Columns 829 through 834	63.5068	63.5835	63.6602	63.7369	63.8136
Columns 835 through 840	63.9670	64.0437	64.1204	64.1971	64.2738
Columns 841 through 846	64.4272	64.5039	64.5806	64.6573	64.7340
Columns 847 through 852	64.8874	64.9641	65.0408	65.1175	65.1942
Columns 853 through 858	65.3476	65.4243	65.5010	65.5777	65.6544
Columns 859 through 864	65.8078	65.8845	65.9612	66.0379	66.1146
Columns 865 through 870	66.2680	66.3447	66.4214	66.4981	66.5748
Columns 871 through 876	66.7282	66.8049	66.8816	66.9583	67.0350
Columns 877 through 882	67.1884	67.2651	67.3418	67.4185	67.4952
Columns 883 through 888	67.6486	67.7253	67.8020	67.8786	67.9553
Columns 889 through 894	68.1087	68.1854	68.2621	68.3388	68.4155
Columns 895 through 900	68.5689	68.6456	68.7223	68.7990	68.8757
Columns 901 through 906	69.0291	69.1058	69.1825	69.2592	69.3359
Columns 907 through 912	69.4893	69.5660	69.6427	69.7194	69.7961
Columns 913 through 918	69.9495	70.0262	70.1029	70.1796	70.2563
Columns 919 through 924	70.4097	70.4864	70.5631	70.6398	70.7165
Columns 925 through 930	70.8699	70.9466	71.0233	71.1000	71.1767
Columns 931 through 936	71.3301	71.4068	71.4835	71.5602	71.6369
Columns 937 through 942	71.7903	71.8670	71.9437	72.0204	72.0971
Columns 943 through 948	72.2505	72.3272	72.4039	72.4806	72.5573
Columns 949 through 954	72.7107	72.7874	72.8641	72.9408	73.0175
Columns 955 through 960	73.1709	73.2476	73.3243	73.4010	73.4777
Columns 961 through 966	73.6311	73.7078	73.7845	73.8612	73.9379
Columns 967 through 972					74.0146

74.0913	74.1680	74.2447	74.3214	74.3981	74.4748
Columns 973 through 978					
74.5515	74.6282	74.7049	74.7816	74.8583	74.9350
Columns 979 through 984					
75.0117	75.0884	75.1651	75.2418	75.3185	75.3952
Columns 985 through 990					
75.4719	75.5486	75.6253	75.7020	75.7787	75.8553
Columns 991 through 996					
75.9320	76.0087	76.0854	76.1621	76.2388	76.3155
Columns 997 through 1002					
76.3922	76.4689	76.5456	76.6223	76.6990	76.7757
Columns 1003 through 1008					
76.8524	76.9291	77.0058	77.0825	77.1592	77.2359
Columns 1009 through 1014					
77.3126	77.3893	77.4660	77.5427	77.6194	77.6961
Columns 1015 through 1020					
77.7728	77.8495	77.9262	78.0029	78.0796	78.1563
Columns 1021 through 1026					
78.2330	78.3097	78.3864	78.4631	78.5398	78.6165
Columns 1027 through 1032					
78.6932	78.7699	78.8466	78.9233	79.0000	79.0767
Columns 1033 through 1038					
79.1534	79.2301	79.3068	79.3835	79.4602	79.5369
Columns 1039 through 1044					
79.6136	79.6903	79.7670	79.8437	79.9204	79.9971
Columns 1045 through 1050					
80.0738	80.1505	80.2272	80.3039	80.3806	80.4573
Columns 1051 through 1056					
80.5340	80.6107	80.6874	80.7641	80.8408	80.9175
Columns 1057 through 1062					
80.9942	81.0709	81.1476	81.2243	81.3010	81.3777
Columns 1063 through 1068					
81.4544	81.5311	81.6078	81.6845	81.7612	81.8379
Columns 1069 through 1074					
81.9146	81.9913	82.0680	82.1447	82.2214	82.2981
Columns 1075 through 1080					
82.3748	82.4515	82.5282	82.6049	82.6816	82.7583
Columns 1081 through 1086					
82.8350	82.9117	82.9884	83.0651	83.1418	83.2185
Columns 1087 through 1092					
83.2952	83.3719	83.4486	83.5253	83.6020	83.6787
Columns 1093 through 1098					
83.7554	83.8321	83.9087	83.9854	84.0621	84.1388
Columns 1099 through 1104					
84.2155	84.2922	84.3689	84.4456	84.5223	84.5990
Columns 1105 through 1110					
84.6757	84.7524	84.8291	84.9058	84.9825	85.0592
Columns 1111 through 1116					
85.1359	85.2126	85.2893	85.3660	85.4427	85.5194
Columns 1117 through 1122					
85.5961	85.6728	85.7495	85.8262	85.9029	85.9796
Columns 1123 through 1128					
86.0563	86.1330	86.2097	86.2864	86.3631	86.4398
Columns 1129 through 1134					
86.5165	86.5932	86.6699	86.7466	86.8233	86.9000
Columns 1135 through 1140					

86.9767	87.0534	87.1301	87.2068	87.2835	87.3602
Columns 1141 through	1146				
87.4369	87.5136	87.5903	87.6670	87.7437	87.8204
Columns 1147 through	1152				
87.8971	87.9738	88.0505	88.1272	88.2039	88.2806
Columns 1153 through	1158				
88.3573	88.4340	88.5107	88.5874	88.6641	88.7408
Columns 1159 through	1164				
88.8175	88.8942	88.9709	89.0476	89.1243	89.2010
Columns 1165 through	1170				
89.2777	89.3544	89.4311	89.5078	89.5845	89.6612
Columns 1171 through	1176				
89.7379	89.8146	89.8913	89.9680	90.0447	90.1214
Columns 1177 through	1182				
90.1981	90.2748	90.3515	90.4282	90.5049	90.5816
Columns 1183 through	1188				
90.6583	90.7350	90.8117	90.8884	90.9651	91.0418
Columns 1189 through	1194				
91.1185	91.1952	91.2719	91.3486	91.4253	91.5020
Columns 1195 through	1200				
91.5787	91.6554	91.7321	91.8088	91.8854	91.9621
Columns 1201 through	1206				
92.0388	92.1155	92.1922	92.2689	92.3456	92.4223
Columns 1207 through	1212				
92.4990	92.5757	92.6524	92.7291	92.8058	92.8825
Columns 1213 through	1218				
92.9592	93.0359	93.1126	93.1893	93.2660	93.3427
Columns 1219 through	1224				
93.4194	93.4961	93.5728	93.6495	93.7262	93.8029
Columns 1225 through	1230				
93.8796	93.9563	94.0330	94.1097	94.1864	94.2631
Columns 1231 through	1236				
94.3398	94.4165	94.4932	94.5699	94.6466	94.7233
Columns 1237 through	1242				
94.8000	94.8767	94.9534	95.0301	95.1068	95.1835
Columns 1243 through	1248				
95.2602	95.3369	95.4136	95.4903	95.5670	95.6437
Columns 1249 through	1254				
95.7204	95.7971	95.8738	95.9505	96.0272	96.1039
Columns 1255 through	1260				
96.1806	96.2573	96.3340	96.4107	96.4874	96.5641
Columns 1261 through	1266				
96.6408	96.7175	96.7942	96.8709	96.9476	97.0243
Columns 1267 through	1272				
97.1010	97.1777	97.2544	97.3311	97.4078	97.4845
Columns 1273 through	1278				
97.5612	97.6379	97.7146	97.7913	97.8680	97.9447
Columns 1279 through	1284				
98.0214	98.0981	98.1748	98.2515	98.3282	98.4049
Columns 1285 through	1290				
98.4816	98.5583	98.6350	98.7117	98.7884	98.8651
Columns 1291 through	1296				
98.9418	99.0185	99.0952	99.1719	99.2486	99.3253
Columns 1297 through	1302				
99.4020	99.4787	99.5554	99.6321	99.7088	99.7855
Columns 1303 through	1308				

99.8621	99.9388	100.0155	100.0922	100.1689	100.245
Columns 1309 through 1314					
100.3223	100.3990	100.4757	100.5524	100.6291	100.7058
Columns 1315 through 1320					
100.7825	100.8592	100.9359	101.0126	101.0893	101.1660
Columns 1321 through 1326					
101.2427	101.3194	101.3961	101.4728	101.5495	101.6262
Columns 1327 through 1332					
101.7029	101.7796	101.8563	101.9330	102.0097	102.0864
Columns 1333 through 1338					
102.1631	102.2398	102.3165	102.3932	102.4699	102.5466
Columns 1339 through 1344					
102.6233	102.7000	102.7767	102.8534	102.9301	103.0068
Columns 1345 through 1350					
103.0835	103.1602	103.2369	103.3136	103.3903	103.4670
Columns 1351 through 1356					
103.5437	103.6204	103.6971	103.7738	103.8505	103.9272
Columns 1357 through 1362					
104.0039	104.0806	104.1573	104.2340	104.3107	104.3874
Columns 1363 through 1368					
104.4641	104.5408	104.6175	104.6942	104.7709	104.8476
Columns 1369 through 1374					
104.9243	105.0010	105.0777	105.1544	105.2311	105.3078
Columns 1375 through 1380					
105.3845	105.4612	105.5379	105.6146	105.6913	105.7680
Columns 1381 through 1386					
105.8447	105.9214	105.9981	106.0748	106.1515	106.2282
Columns 1387 through 1392					
106.3049	106.3816	106.4583	106.5350	106.6117	106.6884
Columns 1393 through 1398					
106.7651	106.8418	106.9185	106.9952	107.0719	107.1486
Columns 1399 through 1404					
107.2253	107.3020	107.3787	107.4554	107.5321	107.6088
Columns 1405 through 1410					
107.6855	107.7622	107.8388	107.9155	107.9922	108.0689
Columns 1411 through 1416					
108.1456	108.2223	108.2990	108.3757	108.4524	108.5291
Columns 1417 through 1422					
108.6058	108.6825	108.7592	108.8359	108.9126	108.9893
Columns 1423 through 1428					
109.0660	109.1427	109.2194	109.2961	109.3728	109.4495
Columns 1429 through 1434					
109.5262	109.6029	109.6796	109.7563	109.8330	109.9097
Columns 1435 through 1440					
109.9864	110.0631	110.1398	110.2165	110.2932	110.3699
Columns 1441 through 1446					
110.4466	110.5233	110.6000	110.6767	110.7534	110.8301
Columns 1447 through 1452					
110.9068	110.9835	111.0602	111.1369	111.2136	111.2903
Columns 1453 through 1458					
111.3670	111.4437	111.5204	111.5971	111.6738	111.7505
Columns 1459 through 1464					
111.8272	111.9039	111.9806	112.0573	112.1340	112.2107
Columns 1465 through 1470					
112.2874	112.3641	112.4408	112.5175	112.5942	112.6709

Columns 1471 through 1476  
112.7476 112.8243 112.9010 112.9777 113.0544 113.1311  
Columns 1477 through 1482  
113.2078 113.2845 113.3612 113.4379 113.5146 113.5913  
Columns 1483 through 1488  
113.6680 113.7447 113.8214 113.8981 113.9748 114.0515  
Columns 1489 through 1494  
114.1282 114.2049 114.2816 114.3583 114.4350 114.5117  
Columns 1495 through 1500  
114.5884 114.6651 114.7418 114.8185 114.8952 114.9719  
Columns 1501 through 1506  
115.0486 115.1253 115.2020 115.2787 115.3554 115.4321  
Columns 1507 through 1512  
115.5088 115.5855 115.6622 115.7389 115.8155 115.8922  
Columns 1513 through 1518  
115.9689 116.0456 116.1223 116.1990 116.2757 116.3524  
Columns 1519 through 1524  
116.4291 116.5058 116.5825 116.6592 116.7359 116.8126  
Columns 1525 through 1530  
116.8893 116.9660 117.0427 117.1194 117.1961 117.2728  
Columns 1531 through 1536  
117.3495 117.4262 117.5029 117.5796 117.6563 117.7330  
Columns 1537 through 1542  
117.8097 117.8864 117.9631 118.0398 118.1165 118.1932  
Columns 1543 through 1548  
118.2699 118.3466 118.4233 118.5000 118.5767 118.6534  
Columns 1549 through 1554  
118.7301 118.8068 118.8835 118.9602 119.0369 119.1136  
Columns 1555 through 1560  
119.1903 119.2670 119.3437 119.4204 119.4971 119.5738  
Columns 1561 through 1566  
119.6505 119.7272 119.8039 119.8806 119.9573 120.0340  
Columns 1567 through 1572  
120.1107 120.1874 120.2641 120.3408 120.4175 120.4942  
Columns 1573 through 1578  
120.5709 120.6476 120.7243 120.8010 120.8777 120.9544  
Columns 1579 through 1584  
121.0311 121.1078 121.1845 121.2612 121.3379 121.4146  
Columns 1585 through 1590  
121.4913 121.5680 121.6447 121.7214 121.7981 121.8748  
Columns 1591 through 1596  
121.9515 122.0282 122.1049 122.1816 122.2583 122.3350  
Columns 1597 through 1602  
122.4117 122.4884 122.5651 122.6418 122.7185 122.7952  
Columns 1603 through 1608  
122.8719 122.9486 123.0253 123.1020 123.1787 123.2554  
Columns 1609 through 1614  
123.3321 123.4088 123.4855 123.5622 123.6389 123.7156  
Columns 1615 through 1620  
123.7922 123.8689 123.9456 124.0223 124.0990 124.1757  
Columns 1621 through 1626  
124.2524 124.3291 124.4058 124.4825 124.5592 124.6359  
Columns 1627 through 1632  
124.7126 124.7893 124.8660 124.9427 125.0194 125.0961  
Columns 1633 through 1638  
125.1728 125.2495 125.3262 125.4029 125.4796 125.5563

Columns 1639 through 1644  
125.6330 125.7097 125.7864 125.8631 125.9398 126.0165  
Columns 1645 through 1650  
126.0932 126.1699 126.2466 126.3233 126.4000 126.4767  
Columns 1651 through 1656  
126.5534 126.6301 126.7068 126.7835 126.8602 126.9369  
Columns 1657 through 1662  
127.0136 127.0903 127.1670 127.2437 127.3204 127.3971  
Columns 1663 through 1668  
127.4738 127.5505 127.6272 127.7039 127.7806 127.8573  
Columns 1669 through 1674  
127.9340 128.0107 128.0874 128.1641 128.2408 128.3175  
Columns 1675 through 1680  
128.3942 128.4709 128.5476 128.6243 128.7010 128.7777  
Columns 1681 through 1686  
128.8544 128.9311 129.0078 129.0845 129.1612 129.2379  
Columns 1687 through 1692  
129.3146 129.3913 129.4680 129.5447 129.6214 129.6981  
Columns 1693 through 1698  
129.7748 129.8515 129.9282 130.0049 130.0816 130.1583  
Columns 1699 through 1704  
130.2350 130.3117 130.3884 130.4651 130.5418 130.6185  
Columns 1705 through 1710  
130.6952 130.7719 130.8486 130.9253 131.0020 131.0787  
Columns 1711 through 1716  
131.1554 131.2321 131.3088 131.3855 131.4622 131.5389  
Columns 1717 through 1722  
131.6156 131.6923 131.7689 131.8456 131.9223 131.9990  
Columns 1723 through 1728  
132.0757 132.1524 132.2291 132.3058 132.3825 132.4592  
Columns 1729 through 1734  
132.5359 132.6126 132.6893 132.7660 132.8427 132.9194  
Columns 1735 through 1740  
132.9961 133.0728 133.1495 133.2262 133.3029 133.3796  
Columns 1741 through 1746  
133.4563 133.5330 133.6097 133.6864 133.7631 133.8398  
Columns 1747 through 1752  
133.9165 133.9932 134.0699 134.1466 134.2233 134.3000  
Columns 1753 through 1758  
134.3767 134.4534 134.5301 134.6068 134.6835 134.7602  
Columns 1759 through 1764  
134.8369 134.9136 134.9903 135.0670 135.1437 135.2204  
Columns 1765 through 1770  
135.2971 135.3738 135.4505 135.5272 135.6039 135.6806  
Columns 1771 through 1776  
135.7573 135.8340 135.9107 135.9874 136.0641 136.1408  
Columns 1777 through 1782  
136.2175 136.2942 136.3709 136.4476 136.5243 136.6010  
Columns 1783 through 1788  
136.6777 136.7544 136.8311 136.9078 136.9845 137.0612  
Columns 1789 through 1794  
137.1379 137.2146 137.2913 137.3680 137.4447 137.5214  
Columns 1795 through 1800  
137.5981 137.6748 137.7515 137.8282 137.9049 137.9816  
Columns 1801 through 1806  
138.0583 138.1350 138.2117 138.2884 138.3651 138.4418



Columns 1807 through 1812  
138.5185 138.5952 138.6719 138.7486 138.8253 138.9020  
Columns 1813 through 1818  
138.9787 139.0554 139.1321 139.2088 139.2855 139.3622  
Columns 1819 through 1824  
139.4389 139.5156 139.5923 139.6690 139.7456 139.8223  
Columns 1825 through 1830  
139.8990 139.9757 140.0524 140.1291 140.2058 140.2825  
Columns 1831 through 1836  
140.3592 140.4359 140.5126 140.5893 140.6660 140.7427  
Columns 1837 through 1842  
140.8194 140.8961 140.9728 141.0495 141.1262 141.2029  
Columns 1843 through 1848  
141.2796 141.3563 141.4330 141.5097 141.5864 141.6631  
Columns 1849 through 1854  
141.7398 141.8165 141.8932 141.9699 142.0466 142.1233  
Columns 1855 through 1860  
142.2000 142.2767 142.3534 142.4301 142.5068 142.5835  
Columns 1861 through 1866  
142.6602 142.7369 142.8136 142.8903 142.9670 143.0437  
Columns 1867 through 1872  
143.1204 143.1971 143.2738 143.3505 143.4272 143.5039  
Columns 1873 through 1878  
143.5806 143.6573 143.7340 143.8107 143.8874 143.9641

>>



LAMPIRAN 4 (EMPAT)  
OUTPUT - METODE FDD  
PADA STRUKTUR BALOK SEDERHANA

OUTPUT PARAMETER MODAL - METODE FDD  
PADA STRUKTUR BALOK SEDERHANA

```

NFFT =
    2048
>> freq
freq =
Columns 1 through 6
    0    0.3068    0.6136    0.9204    1.2272    1.5340
Columns 7 through 12
    1.8408    2.1476    2.4544    2.7612    3.0680    3.3748
Columns 13 through 18
    3.6816    3.9884    4.2951    4.6019    4.9087    5.2155
Columns 19 through 24
    5.5223    5.8291    6.1359    6.4427    6.7495    7.0563
Columns 25 through 30
    7.3631    7.6699    7.9767    8.2835    8.5903    8.8971
Columns 31 through 36
    9.2039    9.5107    9.8175    10.1243    10.4311    10.7379
Columns 37 through 42
    11.0447    11.3515    11.6583    11.9651    12.2718    12.5786
Columns 43 through 48
    12.8854    13.1922    13.4990    13.8058    14.1126    14.4194
Columns 49 through 54
    14.7262    15.0330    15.3398    15.6466    15.9534    16.2602
Columns 55 through 60
    16.5670    16.8738    17.1806    17.4874    17.7942    18.1010
Columns 61 through 66
    18.4078    18.7146    19.0214    19.3282    19.6350    19.9418
Columns 67 through 72
    20.2485    20.5553    20.8621    21.1689    21.4757    21.7825
Columns 73 through 78
    22.0893    22.3961    22.7029    23.0097    23.3165    23.6233
Columns 79 through 84
    23.9301    24.2369    24.5437    24.8505    25.1573    25.4641
Columns 85 through 90
    25.7709    26.0777    26.3845    26.6913    26.9981    27.3049
Columns 91 through 96
    27.6117    27.9185    28.2252    28.5320    28.8388    29.1456
Columns 97 through 102
    29.4524    29.7592    30.0660    30.3728    30.6796    30.9864
Columns 103 through 108
    31.2932    31.6000    31.9068    32.2136    32.5204    32.8272
Columns 109 through 114
    33.1340    33.4408    33.7476    34.0544    34.3612    34.6680
Columns 115 through 120
    34.9748    35.2816    35.5884    35.8952    36.2019    36.5087
Columns 121 through 126
    36.8155    37.1223    37.4291    37.7359    38.0427    38.3495
Columns 127 through 132
    38.6563    38.9631    39.2699    39.5767    39.8835    40.1903
Columns 133 through 138
    40.4971    40.8039    41.1107    41.4175    41.7243    42.0311
Columns 139 through 144

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42.3379	42.6447	42.9515	43.2583	43.5651	43.8719
Columns 145 through 150	44.1786	44.4854	44.7922	45.0990	45.4058
Columns 151 through 156	46.0194	46.3262	46.6330	46.9398	47.2466
Columns 157 through 162	47.8602	48.1670	48.4738	48.7806	49.0874
Columns 163 through 168	49.7010	50.0078	50.3146	50.6214	50.9282
Columns 169 through 174	51.5418	51.8486	52.1553	52.4621	52.7689
Columns 175 through 180	53.3825	53.6893	53.9961	54.3029	54.6097
Columns 181 through 186	55.2233	55.5301	55.8369	56.1437	56.4505
Columns 187 through 192	57.0641	57.3709	57.6777	57.9845	58.2913
Columns 193 through 198	58.9049	59.2117	59.5185	59.8253	60.1320
Columns 199 through 204	60.7456	61.0524	61.3592	61.6660	61.9728
Columns 205 through 210	62.5864	62.8932	63.2000	63.5068	63.8136
Columns 211 through 216	64.4272	64.7340	65.0408	65.3476	65.6544
Columns 217 through 222	66.2680	66.5748	66.8816	67.1884	67.4952
Columns 223 through 228	68.1087	68.4155	68.7223	69.0291	69.3359
Columns 229 through 234	69.9495	70.2563	70.5631	70.8699	71.1767
Columns 235 through 240	71.7903	72.0971	72.4039	72.7107	73.0175
Columns 241 through 246	73.6311	73.9379	74.2447	74.5515	74.8583
Columns 247 through 252	75.4719	75.7787	76.0854	76.3922	76.6990
Columns 253 through 258	77.3126	77.6194	77.9262	78.2330	78.5398
Columns 259 through 264	79.1534	79.4602	79.7670	80.0738	80.3806
Columns 265 through 270	80.9942	81.3010	81.6078	81.9146	82.2214
Columns 271 through 276	82.8350	83.1418	83.4486	83.7554	84.0621
Columns 277 through 282	84.6757	84.9825	85.2893	85.5961	85.9029
Columns 283 through 288	86.5165	86.8233	87.1301	87.4369	87.7437
Columns 289 through 294	88.3573	88.6641	88.9709	89.2777	89.5845
Columns 295 through 300	90.1981	90.5049	90.8117	91.1185	91.4253
Columns 301 through 306	92.0388	92.3456	92.6524	92.9592	93.2660
Columns 307 through 312					

93.8796	94.1864	94.4932	94.8000	95.1068	95.4136
Columns 313 through	318				
95.7204	96.0272	96.3340	96.6408	96.9476	97.2544
Columns 319 through	324				
97.5612	97.8680	98.1748	98.4816	98.7884	99.0952
Columns 325 through	330				
99.4020	99.7088	100.0155	100.3223	100.6291	100.9359
Columns 331 through	336				
101.2427	101.5495	101.8563	102.1631	102.4699	102.7767
Columns 337 through	342				
103.0835	103.3903	103.6971	104.0039	104.3107	104.6175
Columns 343 through	348				
104.9243	105.2311	105.5379	105.8447	106.1515	106.4583
Columns 349 through	354				
106.7651	107.0719	107.3787	107.6855	107.9922	108.2990
Columns 355 through	360				
108.6058	108.9126	109.2194	109.5262	109.8330	110.1398
Columns 361 through	366				
110.4466	110.7534	111.0602	111.3670	111.6738	111.9806
Columns 367 through	372				
112.2874	112.5942	112.9010	113.2078	113.5146	113.8214
Columns 373 through	378				
114.1282	114.4350	114.7418	115.0486	115.3554	115.6622
Columns 379 through	384				
115.9689	116.2757	116.5825	116.8893	117.1961	117.5029
Columns 385 through	390				
117.8097	118.1165	118.4233	118.7301	119.0369	119.3437
Columns 391 through	396				
119.6505	119.9573	120.2641	120.5709	120.8777	121.1845
Columns 397 through	402				
121.4913	121.7981	122.1049	122.4117	122.7185	123.0253
Columns 403 through	408				
123.3321	123.6389	123.9456	124.2524	124.5592	124.8660
Columns 409 through	414				
125.1728	125.4796	125.7864	126.0932	126.4000	126.7068
Columns 415 through	420				
127.0136	127.3204	127.6272	127.9340	128.2408	128.5476
Columns 421 through	426				
128.8544	129.1612	129.4680	129.7748	130.0816	130.3884
Columns 427 through	432				
130.6952	131.0020	131.3088	131.6156	131.9223	132.2291
Columns 433 through	438				
132.5359	132.8427	133.1495	133.4563	133.7631	134.0699
Columns 439 through	444				
134.3767	134.6835	134.9903	135.2971	135.6039	135.9107
Columns 445 through	450				
136.2175	136.5243	136.8311	137.1379	137.4447	137.7515
Columns 451 through	456				
138.0583	138.3651	138.6719	138.9787	139.2855	139.5923
Columns 457 through	462				
139.8990	140.2058	140.5126	140.8194	141.1262	141.4330
Columns 463 through	468				
141.7398	142.0466	142.3534	142.6602	142.9670	143.2738
Columns 469 through	474				
143.5806	143.8874	144.1942	144.5010	144.8078	145.1146
Columns 475 through	480				

145.4214	145.7282	146.0350	146.3418	146.6486	146.9554
Columns 481 through	486				
147.2622	147.5690	147.8757	148.1825	148.4893	148.7961
Columns 487 through	492				
149.1029	149.4097	149.7165	150.0233	150.3301	150.6369
Columns 493 through	498				
150.9437	151.2505	151.5573	151.8641	152.1709	152.4777
Columns 499 through	504				
152.7845	153.0913	153.3981	153.7049	154.0117	154.3185
Columns 505 through	510				
154.6253	154.9321	155.2389	155.5457	155.8524	156.1592
Columns 511 through	516				
156.4660	156.7728	157.0796	157.3864	157.6932	158.0000
Columns 517 through	522				
158.3068	158.6136	158.9204	159.2272	159.5340	159.8408
Columns 523 through	528				
160.1476	160.4544	160.7612	161.0680	161.3748	161.6816
Columns 529 through	534				
161.9884	162.2952	162.6020	162.9088	163.2156	163.5224
Columns 535 through	540				
163.8291	164.1359	164.4427	164.7495	165.0563	165.3631
Columns 541 through	546				
165.6699	165.9767	166.2835	166.5903	166.8971	167.2039
Columns 547 through	552				
167.5107	167.8175	168.1243	168.4311	168.7379	169.0447
Columns 553 through	558				
169.3515	169.6583	169.9651	170.2719	170.5787	170.8855
Columns 559 through	564				
171.1923	171.4991	171.8058	172.1126	172.4194	172.7262
Columns 565 through	570				
173.0330	173.3398	173.6466	173.9534	174.2602	174.5670
Columns 571 through	576				
174.8738	175.1806	175.4874	175.7942	176.1010	176.4078
Columns 577 through	582				
176.7146	177.0214	177.3282	177.6350	177.9418	178.2486
Columns 583 through	588				
178.5554	178.8622	179.1690	179.4758	179.7825	180.0893
Columns 589 through	594				
180.3961	180.7029	181.0097	181.3165	181.6233	181.9301
Columns 595 through	600				
182.2369	182.5437	182.8505	183.1573	183.4641	183.7709
Columns 601 through	606				
184.0777	184.3845	184.6913	184.9981	185.3049	185.6117
Columns 607 through	612				
185.9185	186.2253	186.5321	186.8389	187.1457	187.4525
Columns 613 through	618				
187.7592	188.0660	188.3728	188.6796	188.9864	189.2932
Columns 619 through	624				
189.6000	189.9068	190.2136	190.5204	190.8272	191.1340
Columns 625 through	630				
191.4408	191.7476	192.0544	192.3612	192.6680	192.9748
Columns 631 through	636				
193.2816	193.5884	193.8952	194.2020	194.5088	194.8156
Columns 637 through	642				
195.1224	195.4292	195.7359	196.0427	196.3495	196.6563
Columns 643 through	648				

196.9631	197.2699	197.5767	197.8835	198.1903	198.4971
Columns 649 through	654				
198.8039	199.1107	199.4175	199.7243	200.0311	200.3379
Columns 655 through	660				
200.6447	200.9515	201.2583	201.5651	201.8719	202.1787
Columns 661 through	666				
202.4855	202.7923	203.0991	203.4059	203.7126	204.0194
Columns 667 through	672				
204.3262	204.6330	204.9398	205.2466	205.5534	205.8602
Columns 673 through	678				
206.1670	206.4738	206.7806	207.0874	207.3942	207.7010
Columns 679 through	684				
208.0078	208.3146	208.6214	208.9282	209.2350	209.5418
Columns 685 through	690				
209.8486	210.1554	210.4622	210.7690	211.0758	211.3826
Columns 691 through	696				
211.6893	211.9961	212.3029	212.6097	212.9165	213.2233
Columns 697 through	702				
213.5301	213.8369	214.1437	214.4505	214.7573	215.0641
Columns 703 through	708				
215.3709	215.6777	215.9845	216.2913	216.5981	216.9049
Columns 709 through	714				
217.2117	217.5185	217.8253	218.1321	218.4389	218.7457
Columns 715 through	720				
219.0525	219.3593	219.6660	219.9728	220.2796	220.5864
Columns 721 through	726				
220.8932	221.2000	221.5068	221.8136	222.1204	222.4272
Columns 727 through	732				
222.7340	223.0408	223.3476	223.6544	223.9612	224.2680
Columns 733 through	738				
224.5748	224.8816	225.1884	225.4952	225.8020	226.1088
Columns 739 through	744				
226.4156	226.7224	227.0292	227.3360	227.6427	227.9495
Columns 745 through	750				
228.2563	228.5631	228.8699	229.1767	229.4835	229.7903
Columns 751 through	756				
230.0971	230.4039	230.7107	231.0175	231.3243	231.6311
Columns 757 through	762				
231.9379	232.2447	232.5515	232.8583	233.1651	233.4719
Columns 763 through	768				
233.7787	234.0855	234.3923	234.6991	235.0059	235.3127
Columns 769 through	774				
235.6194	235.9262	236.2330	236.5398	236.8466	237.1534
Columns 775 through	780				
237.4602	237.7670	238.0738	238.3806	238.6874	238.9942
Columns 781 through	786				
239.3010	239.6078	239.9146	240.2214	240.5282	240.8350
Columns 787 through	792				
241.1418	241.4486	241.7554	242.0622	242.3690	242.6758
Columns 793 through	798				
242.9826	243.2894	243.5961	243.9029	244.2097	244.5165
Columns 799 through	804				
244.8233	245.1301	245.4369	245.7437	246.0505	246.3573
Columns 805 through	810				
246.6641	246.9709	247.2777	247.5845	247.8913	248.1981
Columns 811 through	816				

248.5049	248.8117	249.1185	249.4253	249.7321	250.0389
Columns 817 through	822				
250.3457	250.6525	250.9593	251.2661	251.5728	251.8796
Columns 823 through	828				
252.1864	252.4932	252.8000	253.1068	253.4136	253.7204
Columns 829 through	834				
254.0272	254.3340	254.6408	254.9476	255.2544	255.5612
Columns 835 through	840				
255.8680	256.1748	256.4816	256.7884	257.0952	257.4020
Columns 841 through	846				
257.7088	258.0156	258.3224	258.6292	258.9360	259.2428
Columns 847 through	852				
259.5495	259.8563	260.1631	260.4699	260.7767	261.0835
Columns 853 through	858				
261.3903	261.6971	262.0039	262.3107	262.6175	262.9243
Columns 859 through	864				
263.2311	263.5379	263.8447	264.1515	264.4583	264.7651
Columns 865 through	870				
265.0719	265.3787	265.6855	265.9923	266.2991	266.6059
Columns 871 through	876				
266.9127	267.2195	267.5262	267.8330	268.1398	268.4466
Columns 877 through	882				
268.7534	269.0602	269.3670	269.6738	269.9806	270.2874
Columns 883 through	888				
270.5942	270.9010	271.2078	271.5146	271.8214	272.1282
Columns 889 through	894				
272.4350	272.7418	273.0486	273.3554	273.6622	273.9690
Columns 895 through	900				
274.2758	274.5826	274.8894	275.1962	275.5029	275.8097
Columns 901 through	906				
276.1165	276.4233	276.7301	277.0369	277.3437	277.6505
Columns 907 through	912				
277.9573	278.2641	278.5709	278.8777	279.1845	279.4913
Columns 913 through	918				
279.7981	280.1049	280.4117	280.7185	281.0253	281.3321
Columns 919 through	924				
281.6389	281.9457	282.2525	282.5593	282.8661	283.1729
Columns 925 through	930				
283.4796	283.7864	284.0932	284.4000	284.7068	285.0136
Columns 931 through	936				
285.3204	285.6272	285.9340	286.2408	286.5476	286.8544
Columns 937 through	942				
287.1612	287.4680	287.7748	288.0816	288.3884	288.6952
Columns 943 through	948				
289.0020	289.3088	289.6156	289.9224	290.2292	290.5360
Columns 949 through	954				
290.8428	291.1496	291.4563	291.7631	292.0699	292.3767
Columns 955 through	960				
292.6835	292.9903	293.2971	293.6039	293.9107	294.2175
Columns 961 through	966				
294.5243	294.8311	295.1379	295.4447	295.7515	296.0583
Columns 967 through	972				
296.3651	296.6719	296.9787	297.2855	297.5923	297.8991
Columns 973 through	978				
298.2059	298.5127	298.8195	299.1263	299.4330	299.7398
Columns 979 through	984				



300.0466	300.3534	300.6602	300.9670	301.2738	301.5806
Columns 985 through 990					
301.8874	302.1942	302.5010	302.8078	303.1146	303.4214
Columns 991 through 996					
303.7282	304.0350	304.3418	304.6486	304.9554	305.2622
Columns 997 through 1002					
305.5690	305.8758	306.1826	306.4894	306.7962	307.1030
Columns 1003 through 1008					
307.4097	307.7165	308.0233	308.3301	308.6369	308.9437
Columns 1009 through 1014					
309.2505	309.5573	309.8641	310.1709	310.4777	310.7845
Columns 1015 through 1020					
311.0913	311.3981	311.7049	312.0117	312.3185	312.6253
Columns 1021 through 1025					
312.9321	313.2389	313.5457	313.8525	314.1593	

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