

## รายการอ้างอิง

### ภาษาไทย

- นภดล คุณาทศนะดีกุล. สเปกตรัมการตอบสนองในช่วงอินฟราเรดสำหรับออกแบบอาคารต้านแผ่นดินไหวในประเทศไทย. วิทยานิพนธ์ปริญญาโทบัณฑิต ภาควิศวกรรมโยธา บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย, 2539.
- ปณิธาน ลักคุณะประสิทธิ์และคณะ. การออกแบบโครงสร้างต้านทานแผ่นดินไหว. เอกสารอบรม ศูนย์เชี่ยวชาญเฉพาะทางด้านวิศวกรรมแผ่นดินไหวและการสั่นสะเทือน ภาควิศวกรรมโยธา บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย, 2546.
- ปณิธาน ลักคุณะประสิทธิ์ และ เป็นหนึ่ง วานิชชัย. ความเสียหายจากแผ่นดินไหวที่อำเภอพาน จังหวัดเชียงราย. โยธาสาร 7,(2538):9-16
- สุมาลี ประจวบ. แผ่นดินไหวและมาตรการป้องกัน. เอกสารวิชาการเลขที่ 500-348-O1-2539 กรมอุตุนิยมวิทยา, 2539.
- สุมาลี ประจวบและ บุรินทร์ เวชบรรเทิง. ความรู้พื้นฐานด้านแผ่นดินไหว. สำนักงานแผ่นดินไหว กรมอุตุนิยมวิทยา, 2539.

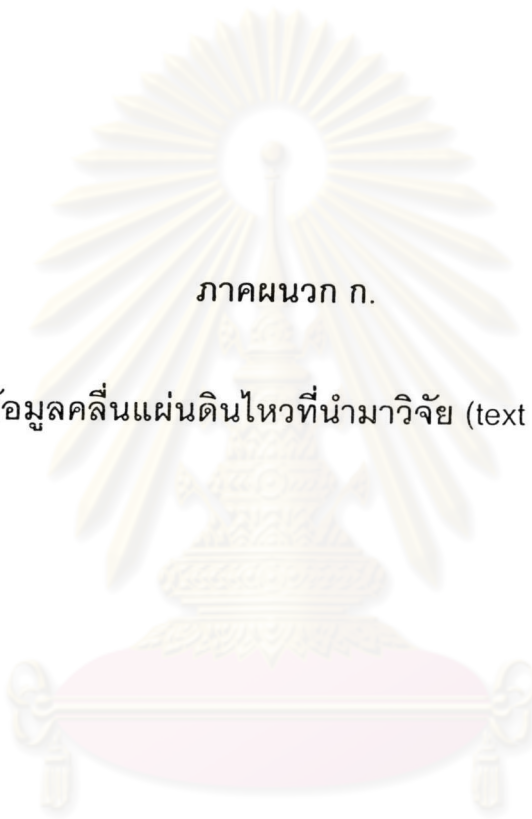
### ภาษาอังกฤษ

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- Kim, S. H. Dynamic Analysis of Ground Motion During Earthquake in Bangkok Area. M.Eng.Thesis.Asian Institute of Technology, 1985.
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ภาคผนวก

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



ภาคผนวก ก.

ข้อมูลคลื่นแผ่นดินไหวที่นำมาวิจัย (text file)

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

## เหตุการณ์ที่ 14 พฤศจิกายน 2543

```

;SUD2ASC -Win32 Version 2.90
;Input file: C:\THESIS\EVENT\3BF23912.NET
;Output file:c:\thesis\event\3BF23912.txt
;Converted @ 06/30/04 01:45:54.522
;Dateform: Month/Day
;No Data: FALSE

$ 50 ; StationComp structure
TMD                ; network
KA34               ; station name
V                 ; component
0                 ; instrument type
0                 ; component azimuth
0                 ; component incidence
-32767.000000     ; latitude
-32767.000000     ; longitude
-32767.000000     ; elevation, meters
-                 ; enclosure
0                 ; annotated comment
r                 ; recorder type
--                ; rock class
0                 ; rock type
-                 ; site condition
-                 ; sensor type
2                 ; data type
d                 ; data units
n                 ; polarity
0                 ; status
8192.000000       ; maximum gain
8388607.000000    ; clipping value
0.001907          ; conversion to mvolts
4                 ; channel
1                 ; atod gain
11/14/01 09:27:35.000000 ; effective date
+0.000000         ; clock correction
+0.000000         ; station delay
                  ; long network
                  ; long station
                  ; long component

$ 310 ; Instrument structure
TMD                ; network
KA34               ; station name
V                 ; component
0                 ; instrument type
937                ; inst.serial number
-32767             ; number of components
4                 ; channel number
V                 ; sensor type
2                 ; data type
-8388608           ; void sample value

```

```

524288.000000          ; digitizing constant
20.000000             ; AAF corner freq.(Hz)
41.666599             ; AAF poles
-32767.000000         ; trans natural freq.(Hz)
-32767.000000         ; trans damping coeff.
-32767.000000         ; trans motion constant
0.000000              ; amplifier gain (dB)
-32767.000000         ; local X coord.(meters)
-32767.000000         ; local Y coord.(meters)
-32767.000000         ; local Z coord.(meters)
11/14/01 09:27:35.000000 ; effective time
11.140000             ; pre-event memory (secs)
154                   ; trigger number
TMD N                 ; study ID
-32767               ; sensor serial number
                     ; long network
                     ; long station
                     ; long component

$ 7514932 ; DescripTrace structure
TMD                   ; network
KA34                  ; station name
V                     ; component
0                     ; instrument type
11/14/01 09:27:35.250000 ; initial sample time
-32767                ; local time diff
2                     ; data type
-                     ; data descriptor
0                     ; digitized by
0                     ; processed by
128733                ; number of samples
50.000000             ; samples per second
-8388607.000000      ; minimum data value
8388607.000000       ; maximum data value
0.000000              ; average noise
-32767                ; num clipped samples
+0.000000             ; time correction
+0.000000             ; rate correction
                     ; long network
                     ; long station
                     ; long component

876  926  839  919  898
776  920  953  805  774

```

## เหตุการณ์ที่ 2 18 กันยายน 2546

ก. 3F699076.CH2

```
;SUD2ASC -Version 2.60
;Input file: C:\THESIS\03261\3F699076.CH2
;Output file: C:\THESIS\03261\3F699076.TES
;Converted @ 05/08/04 03:30:03.310
;Dateform: Month/Day
;No Data: FALSE
```

\$ 50 ; StationComp structure

```
unk ; network
CH24 ; station name
- ; component
0 ; instrument type
-32767 ; component azimuth
-32767 ; component incidence
-32767.000000 ; latitude
-32767.000000 ; longitude
-32767.000000 ; elevation, meters
- ; enclosure
0 ; annotated comment
r ; recorder type
- ; rock class
0 ; rock type
- ; site condition
- ; sensor type
2 ; data type
d ; data units
n ; polarity
0 ; status
8192.000000 ; maximum gain
8388607.000000 ; clipping value
0.001907 ; conversion to mvolts
4 ; channel
32 ; atod gain
09/18/03 11:01:10.000000 ; effective date
+0.000000 ; clock correction
+0.000000 ; station delay
```

\$ 310 ; Instrument structure

```
unk ; network
CH24 ; station name
- ; component
0 ; instrument type
942 ; inst.serial number
-32767 ; number of components
4 ; channel number
- ; sensor type
2 ; data type
-8388608 ; void sample value
524288.000000 ; digitizing constant
20.000000 ; AAF corner freq.(Hz)
```



```

41.666599          ; AAF poles
-32767.000000     ; trans natural freq.(Hz)
-32767.000000     ; trans damping coeff.
-32767.000000     ; trans motion constant
30.157118         ; amplifier gain (dB)
-32767.000000     ; local X coord.(meters)
-32767.000000     ; local Y coord.(meters)
-32767.000000     ; local Z coord.(meters)
09/18/03 11:01:10.000000 ; effective time
0.000000          ; pre-event memory (secs)
864               ; trigger number
                 ; study ID
-32767           ; sensor serial number

$ 7180276 ; DescripTrace structure
unk          ; network
CH24        ; station name
-           ; component
0           ; instrument type
09/18/03 11:01:10.737000 ; initial sample time
-32767      ; local time diff
2           ; data type
-           ; data descriptor
0           ; digitized by
0           ; processed by
45069       ; number of samples
50.000000   ; samples per second
-8388607.000000 ; minimum data value
8388607.000000 ; maximum data value
0.000000    ; average noise
-32767      ; num clipped samples
+0.000000   ; time correction
-0.000000   ; rate correction
-1063 -1243 -1928 -2256 -2030
-1561 -1264 -1560 -1812 -1841

```

### ข. 3F69910B.CM2

```

;SUD2ASC -Version 2.60
;Input file: C:\THESIS\03022\3F69910B.CM2
;Output file: C:\THESIS\03022\3F69910B.TES
;Converted @ 05/11/04 19:50:41.860
;Dateform: Month/Day
;No Data: FALSE

```

```

$ 50 ; StationComp structure
unk          ; network
CM24        ; station name
-           ; component
0           ; instrument type
-32767      ; component azimuth
-32767      ; component incidence

```

```

-32767.000000      ; latitude
-32767.000000      ; longitude
-32767.000000      ; elevation, meters
-                  ; enclosure
0                  ; annotated comment
r                  ; recorder type
-                  ; rock class
0                  ; rock type
-                  ; site condition
-                  ; sensor type
2                  ; data type
d                  ; data units
n                  ; polarity
0                  ; status
8192.000000        ; maximum gain
8388607.000000     ; clipping value
0.001907           ; conversion to mvolts
4                  ; channel
32                 ; atod gain
09/18/03 11:03:39.000000 ; effective date
+0.000000         ; clock correction
+0.000000         ; station delay

$ 310 ; Instrument structure
unk                  ; network
CM24                 ; station name
-                   ; component
0                   ; instrument type
932                 ; inst.serial number
-32767              ; number of components
4                   ; channel number
-                   ; sensor type
2                   ; data type
-8388608            ; void sample value
524288.000000       ; digitizing constant
20.009000           ; AAF corner freq.(Hz)
41.666599           ; AAF poles
-32767.000000       ; trans natural freq.(Hz)
-32767.000000       ; trans damping coeff.
-32767.000000       ; trans motion constant
30.157118           ; amplifier gain (dB)
-32767.000000       ; local X coord.(meters)
-32767.000000       ; local Y coord.(meters)
-32767.000000       ; local Z coord.(meters)
09/18/03 11:03:39.000000 ; effective time
0.000000           ; pre-event memory (secs)
1929                ; trigger number
                    ; study ID
-32767              ; sensor serial number

$ 7180276 ; DescripTrace structure
unk                  ; network
CM24                 ; station name

```



```

-           ; component
0           ; instrument type
09/18/03 11:03:39.132000 ; initial sample time
-32767     ; local time diff
2          ; data type
-           ; data descriptor
0          ; digitized by
0          ; processed by
45069     ; number of samples
50.000000 ; samples per second
-8388607.000000 ; minimum data value
8388607.000000 ; maximum data value
0.000000   ; average noise
-32767     ; num clipped samples
+0.000000  ; time correction
+0.000000  ; rate correction
-343 -359 -311 -370 -341
-349 -299 -342 -320 -280

```

เหตุการณ์ที่ 3 22 กันยายน 2546

ก. 3F6DE91A.CH2

```

;SUD:ASC -Version 2.60
;Input file: C:\TEMP\EK\THESIS\CH.STA\03264\3F6DE91A.CH2
;Output file: C:\TEMP\EK\THESIS\CH.STA\03264\3F6DE91A.TES
;Converted @ 03/10/04 22:35:31.250
;Dateform: Month:Day
;No Data: FALSE

```

```

$ 50 ; StationComp structure
unk           ; network
CH24         ; station name
-           ; component
0           ; instrument type
-32767      ; component azimuth
-32767      ; component incidence
-32767.000000 ; latitude
-32767.000000 ; longitude
-32767.000000 ; elevation, meters
-           ; enclosure
0           ; annotated comment
r           ; recorder type
-           ; rock class
0           ; rock type
-           ; site condition
-           ; sensor type
2           ; data type
d           ; data units
n           ; polarity
0           ; status
8192.000000 ; maximum gain

```

```

8388607.000000          ; clipping value
0.001907                ; conversion to mvolts
4                        ; channel
32                       ; atod gain
09/21/03 18:08:26.000000 ; effective date
+0.000000              ; clock correction
+0.000000              ; station delay

$ 310 ; Instrument structure
unk                    ; network
CH24                   ; station name
-                       ; component
0                       ; instrument type
942                    ; inst.serial number
-32767                 ; number of components
4                       ; channel number
-                       ; sensor type
2                       ; data type
-8388608               ; void sample value
524288.000000          ; digitizing constant
20.000000              ; AAF corner freq.(Hz)
41.666599              ; AAF poles
-32767.000000          ; trans natural freq.(Hz)
-32767.000000          ; trans damping coeff.
-32767.000000          ; trans motion constant
30.157118              ; amplifier gain (dB)
-32767.000000          ; local X coord(meters)
-32767.000000          ; local Y coord(meters)
-32767.000000          ; local Z coord(meters)
09/21/03 18:08:26.000000 ; effective time
0.000000               ; pre-event memory (secs)
1538                   ; trigger number
                        ; study ID
-32767                 ; sensor serial number

$ 7180276 ; DescripTrace structure
unk                    ; network
CH24                   ; station name
-                       ; component
0                       ; instrument type
09/21/03 18:08:26.817000 ; initial sample time
-32767                 ; local time diff
2                       ; data type
-                       ; data descriptor
0                       ; digitized by
0                       ; processed by
45069                  ; number of samples
50.000000              ; samples per second
-8388607.000000        ; minimum data value
8388607.000000         ; maximum data value
0.000000               ; average noise
-32767                 ; num clipped samples

```

```

+0.000000          ; time correction
+0.000000          ; rate correction
-2576  -2553  -2577  -2477  -2620
-2618  -2494  -2551  -2561  -2580

```

## ๓. 3F6DEADB.CM2

```

;SUD2ASC -Version 2.60
;Input file: C:\THESIS\03022\3F6DEADB.CM2
;Output file: C:\THESIS\03022\EADB.TES
;Converted @ 05/10/04 21:11:30.460
;Dateform: Month/Day
;No Data: FALSE

$ 50 ; StationComp structure
unk          ; network
CM24         ; station name
-           ; component
0           ; instrument type
-32767      ; component azimuth
-32767      ; component incidence
-32767.000000 ; latitude
-32767.000000 ; longitude
-32767.000000 ; elevation, meters
-           ; enclosure
0           ; annotated comment
r           ; recorder type
-           ; rock class
0           ; rock type
-           ; site condition
-           ; sensor type
2           ; data type
d           ; data units
n           ; polarity
0           ; status
8192.000000 ; maximum gain
8388607.000000 ; clipping value
0.001907    ; conversion to mvolts
4           ; channel
32          ; atod gain
09/21/03 18:15:55.000000 ; effective date
+0.000000   ; clock correction
-0.000000   ; station delay

$ 310 ; Instrument structure
unk          ; network
CM24         ; station name
-           ; component
0           ; instrument type
932         ; inst.serial number
-32767      ; number of components
4           ; channel number

```

```

-           ; sensor type
2           ; data type
-8388608   ; void sample value
524288.000000 ; digitizing constant
20.000000  ; AAF corner freq.(Hz)
41.666599  ; AAF poles
-32767.000000 ; trans natural freq.(Hz)
-32767.000000 ; trans damping coeff.
-32767.000000 ; trans motion constant
30.157118  ; amplifier gain (dB)
-32767.000000 ; local X coord.(meters)
-32767.000000 ; local Y coord.(meters)
-32767.000000 ; local Z coord.(meters)
09/21/03 18:15:55.000000 ; effective time
0.000000   ; pre-event memory (secs)
2476       ; trigger number
           ; study ID
-32767     ; sensor serial number

$ 7180276 ; DescripTrace structure
unk        ; network
CM24       ; station name
-          ; component
0          ; instrument type
09/21/03 18:15:55.843000 ; initial sample time
-32767     ; local time diff
2          ; data type
-          ; data descriptor
0          ; digitized by
0          ; processed by
45069      ; number of samples
50.000000  ; samples per second
-8388607.000000 ; minimum data value
8388607.000000 ; maximum data value
0.000000   ; average noise
-32767     ; num clipped samples
+0.000000  ; time correction
+0.000000  ; rate correction
-171 -197 -181 -176 -197
-179 -184 -188 -178 -190

```

### ค.จังหวัด ตาก

```

$ 50 ; StationComp structure
unk        ; network
TA34       ; station name
-          ; component

```

```

0                ; instrument type
-32767           ; component azimuth
-32767           ; component incidence
-32767.000000   ; latitude
-32767.000000   ; longitude
-32767.000000   ; elevation, meters
-               ; enclosure
0               ; annotated comment
r              ; recorder type
-               ; rock class
0              ; rock type
-               ; site condition
-               ; sensor type
2              ; data type
d              ; data units
n              ; polarity
0              ; status
8192.000000     ; maximum gain
8388607.000000  ; clipping value
0.001907        ; conversion to mvolts
4               ; channel
32              ; atod gain
09/21/03 18:16:57.000000 ; effective date
+0.000000       ; clock correction
+0.000000       ; station delay

$ 310 ; Instrument structure
unk          ; network
TA31         ; station name
-            ; component
0            ; instrument type
939         ; inst.serial number
-32767      ; number of components
4           ; channel number
-           ; sensor type
2           ; data type
-8388608   ; void sample value
524288.000000 ; digitizing constant
20.000000  ; AAF corner freq.(Hz)
41.666599  ; AAF poles
-32767.000000 ; trans natural freq.(Hz)
-32767.000000 ; trans damping coeff.
-32767.000000 ; trans motion constant
30.157118  ; amplifier gain (dB)
-32767.000000 ; local X coord.(meters)
-32767.000000 ; local Y coord.(meters)
-32767.000000 ; local Z coord.(meters)
09/21/03 18:16:57.000000 ; effective time
11.600000  ; pre-event memory (secs)
17         ; trigger number
           ; study ID
-32767     ; sensor serial number

```



```

$ 7174300 ; DescripTrace structure
unk                ; network
TA34               ; station name
-                 ; component
0                 ; instrument type
09/21/03 18:16:57.529000 ; initial sample time
-32767            ; local time diff
2                 ; data type
-                 ; data descriptor
0                 ; digitized by
0                 ; processed by
43575             ; number of samples
50.000000         ; samples per second
-8388607.000000   ; minimum data value
8388607.000000   ; maximum data value
0.000000         ; average noise
-32767            ; num clipped samples
+0.000000        ; time correction
+0.000000        ; rate correction
    581    542    441    563    602
    441    483    633    545    396

```

### ๓. 3F6EAAC2.CH2

```

;SUD2ASC -Version 2.60
;Input file C:\THESIS\03265\3F6EAAC2.CH2
;Output file C:\THESIS\03265\3F6EAAC2.TES
;Converted @ 05/09/04 21:28:48.880
;Dateform Month/Day
;No Data FALSE

```

```

$ 50 ; StationComp structure
unk                ; network
CH24               ; station name
-                 ; component
0                 ; instrument type
-32767            ; component azimuth
-32767            ; component incidence
-32767.000000     ; latitude
-32767.000000     ; longitude
-32767.000000     ; elevation, meters
-                 ; enclosure
0                 ; annotated comment
r                 ; recorder type
-                 ; rock class
0                 ; rock type
-                 ; site condition
-                 ; sensor type
2                 ; data type
d                 ; data units
n                 ; polarity
0                 ; status
8192.000000       ; maximum gain
8388607.000000    ; clipping value
0.001907          ; conversion to mvolts

```

```

4                ; channel
32              ; atod gain
09/22/03 07:54:42.000000    ; effective date
+0.000000        ; clock correction
+0.000000        ; station delay

$ 310 ; Instrument structure
unk                ; network
CH24              ; station name
-                ; component
0                ; instrument type
942              ; inst.serial number
-32767           ; number of components
4                ; channel number
-                ; sensor type
2                ; data type
-8388608         ; void sample value
524288.000000    ; digitizing constant
20.000000       ; AAF corner freq.(Hz)
41.666599       ; AAF poles
-32767.000000   ; trans natural freq.(Hz)
-32767.000000   ; trans damping coeff.
-32767.000000   ; trans motion constant
30.157118      ; amplifier gain (dB)
-32767.000000   ; local X coord (meters)
-32767.000000   ; local Y coord (meters)
-32767.000000   ; local Z coord (meters)
09/22/03 07:54:42.000000    ; effective time
0.000000        ; pre-event memory (secs)
1650            ; trigger number
                ; study ID
-32767          ; sensor serial number

$ 7180276 ; DescripTrace structure
unk                ; network
CH24              ; station name
-                ; component
0                ; instrument type
09/22/03 07:54:42.717000    ; initial sample time
-32767           ; local time diff
2                ; data type
-                ; data descriptor
0                ; digitized by
0                ; processed by
45069           ; number of samples
50.000000       ; samples per second
-8388607.000000 ; minimum data value
8388607.000000  ; maximum data value
0.000000       ; average noise
-32767         ; num clipped samples
+0.000000      ; time correction
+0.000000      ; rate correction

```

-2119 -3051 -3591 -2612 -2475  
 -2242 -2483 -3442 -3100 -2601

๑.

```
;SUD2ASC -Version 2.60
;Input file: C:\THESIS\03265\3F6ED17D.CH2
;Output file:C:\THESIS\03265\3F6ED17D.TES
;Converted @ 05/09/04 21:37:45.290
;Dateform: Month/Day
;No Data: FALSE
```

```
$ 50 ; StationComp structure
unk ; network
CH24 ; station name
- ; component
0 ; instrument type
-32767 ; component azimuth
-32767 ; component incidence
-32767.000000 ; latitude
-32767.000000 ; longitude
-32767.000000 ; elevation, meters
- ; enclosure
0 ; annotated comment
r ; recorder type
- ; rock class
0 ; rock type
- ; site condition
- ; sensor type
2 ; data type
d ; data units
n ; polarity
0 ; status
8192.000000 ; maximum gain
8388607.000000 ; clipping value
0.001907 ; conversion to mvolts
4 ; channel
32 ; atod gain
09/22/03 10:39:57.000000 ; effective date
+0.000000 ; clock correction
+0.000000 ; station delay

$ 310 ; Instrument structure
unk ; network
CH24 ; station name
- ; component
0 ; instrument type
942 ; inst.serial number
-32767 ; number of components
4 ; channel number
- ; sensor type
2 ; data type
-8388608 ; void sample value
524288.000000 ; digitizing constant
20.000000 ; AAF corner freq.(Hz)
```

```

41.666599                ; AAF poles
-32767.000000           ; trans natural freq.(Hz)
-32767.000000           ; trans damping coeff.
-32767.000000           ; trans motion constant
30.157118                ; amplifier gain (dB)
-32767.000000           ; local X coord.(meters)
-32767.000000           ; local Y coord.(meters)
-32767.000000           ; local Z coord.(meters)
09/22/03 10:39:57.000000 ; effective time
0.000000                ; pre-event memory (secs)
1672                    ; trigger number
                        ; study ID
-32767                  ; sensor serial number

$ 7180276 ; DescripTrace structure
unk                    ; network
CH24                   ; station name
-                       ; component
0                       ; instrument type
09/22/03 10:39:57 897000 ; initial sample time
-32767                 ; local time diff
2                      ; data type
-                       ; data descriptor
0                      ; digitized by
0                      ; processed by
45069                  ; number of samples
50.000000!             ; samples per second
-8388607 0000000      ; minimum data value
8388607 0000000       ; maximum data value
0.000000               ; average noise
-32767                 ; num clipped samples
+0.000000              ; time correction
+0.000000              ; rate correction
-2968 -2886 -2794 -2857 -2935
-2944 2808 -2848 -2990 -3005

```

#### ฉ. 3FD38A46.CM2

```

;SUD2ASC Win32 Version 2.90
;Input file: C:\2001\3FD38A46.CM2
;Output file:c:\thesis\event\3FD38A46.txt
;Converted @ 08/19/04 02:42:57.584
;Dateform: Month/Day
;No Data: FALSE

```

```

$ 50 ; StationComp structure
unk                    ; network
CM24                   ; station name
-                       ; component
0                      ; instrument type
-32767                 ; component azimuth
-32767                 ; component incidence

```

```

-32767.000000      ; latitude
-32767.000000      ; longitude
-32767.000000      ; elevation, meters
-                ; enclosure
0                ; annotated comment
r                ; recorder type
-                ; rock class
0                ; rock type
-                ; site condition
-                ; sensor type
2                ; data type
d                ; data units
n                ; polarity
0                ; status
8192.000000        ; maximum gain
8388607.000000     ; clipping value
0.001907          ; conversion to mvolts
4                ; channel
32               ; atod gain
12/07/03 20:15:02.000000 ; effective date
+0.000000        ; clock correction
+0.000000        ; station delay
                  ; long network
                  ; long station
                  ; long component

$ 310 ; Instrument structure
unk                ; network
CM24              ; station name
-                ; component
0                ; instrument type
932              ; inst.serial number
-32767           ; number of components
4                ; channel number
-                ; sensor type
2                ; data type
-8388608        ; void sample value
524288.000000    ; digitizing constant
20.000000        ; AAF corner freq.(Hz)
41.666599       ; AAF poles
-32767.000000    ; trans natural freq.(Hz)
-32767.000000    ; trans damping coeff.
-32767.000000    ; trans motion constant
30.157118       ; amplifier gain (dB)
-32767.000000    ; local X coord(meters)
-32767.000000    ; local Y coord(meters)
-32767.000000    ; local Z coord(meters)
12/07/03 20:15:02.000000 ; effective time
0.000000        ; pre-event memory (secs)
4898            ; trigger number
                ; study ID
-32767          ; sensor serial number
                ; long network
                ; long station

```



```

; long component

$ 7180276 ; DescripTrace structure
unk ; network
CM24 ; station name
- ; component
0 ; instrument type
12/07/03 20:15:02.802000 ; initial sample time
-32767 ; local time diff
2 ; data type
- ; data descriptor
0 ; digitized by
0 ; processed by
45069 ; number of samples
50.000000 ; samples per second
-8388607.000000 ; minimum data value
8388607.000000 ; maximum data value
0.000000 ; average noise
-32767 ; num clipped samples
+0.000000 ; time correction
+0.000000 ; rate correction
; long network
; long station
; long component
-330 -308 -318 -326 -325
-340 -316 -310 -333 -317

```

เหตุการณ์ที่ 4 29 กันยายน 2546

```

;SUD2ASC -Win32 Version 2.90
;Input file: C:\2001\3\F77AEC7\CM2
;Output file: c:\TESTEK\3\F77AEC7.txt
;Converted @ 07/04/04 16:43:57.225
;Dateform: Month/Day
;No Data: FALSE

```

```

$ 50 ; StationComp structure
unk ; network
CM24 ; station name
- ; component
0 ; instrument type
-32767 ; component azimuth
-32767 ; component incidence
-32767.000000 ; latitude
-32767.000000 ; longitude
-32767.000000 ; elevation, meters
- ; enclosure
0 ; annotated comment
r ; recorder type
- ; rock class
0 ; rock type
- ; site condition
- ; sensor type

```

```

2                ; data type
d                ; data units
n                ; polarity
0                ; status
8192.000000     ; maximum gain
8388607.000000 ; clipping value
0.001907       ; conversion to mvolts
4                ; channel
32              ; atod gain
09/29/03 04:02:15.000000 ; effective date
+0.000000      ; clock correction
+0.000000      ; station delay
                ; long network
                ; long station
                ; long component

$ 310 ; Instrument structure
unk                ; network
CM24              ; station name
-                 ; component
0                 ; instrument type
932              ; inst.serial number
-32767           ; number of components
4                ; channel number
-                 ; sensor type
2                ; data type
8388608          ; void sample value
524288.000000    ; digitizing constant
20.000000        ; AAF corner freq (Hz)
41.666599        ; AAF poles
32767.000000     ; trans natural freq (Hz)
32767.000000     ; trans damping coeff
32767.000000     ; trans motion constant
30.157118        ; amplifier gain (dB)
-32767.000000    ; local X coord (meters)
-32767.000000    ; local Y coord (meters)
-32767.000000    ; local Z coord (meters)
09/29/03 04:02 15.000000 ; effective time
0.000000         ; pre-event memory (secs)
3901             ; trigger number
                ; study ID
-32767          ; sensor serial number
                ; long network
                ; long station
                ; long component

$ 7180276 ; DescripTrace structure
unk                ; network
CM24              ; station name
-                 ; component
0                 ; instrument type
09/29/03 04:02 15.643000 ; initial sample time
-32767           ; local time diff
2                ; data type

```

```

-           ; data descriptor
0           ; digitized by
0           ; processed by
45069      ; number of samples
50.000000  ; samples per second
-8388607.000000 ; minimum data value
8388607.000000 ; maximum data value
0.000000   ; average noise
-32767     ; num clipped samples
+0.000000  ; time correction
+0.000000  ; rate correction
           ; long network
           ; long station
           ; long component

-290 -287 -271 -345 -350
-274 -319 -262 -196 -290
-297 -333 -338 -267 -284

```

เหตุการณ์ที่ 5 30 ตุลาคม 2546

ก. 3FA12C12.CH2

```

;SUD2ASC -Version 2.60
;Input file: C:\THESIS\03303\3FA12C12.CH2
;Output file C:\THESIS\03303\3FA12C12.TES
;Converted @ 05 09 04 22:38:07.840
;Dateform Month:Day
;No Data FALSE

```

```

$ 5.0 ; StationComp structure
unk           ; network
CH24         ; station name
-           ; component
0           ; instrument type
-32767      ; component azimuth
-32767      ; component incidence
-32767.000000 ; latitude
-32767.000000 ; longitude
-32767.000000 ; elevation, meters
-           ; enclosure
0           ; annotated comment
r           ; recorder type
-           ; rock class
0           ; rock type
-           ; site condition
-           ; sensor type
2           ; data type
d           ; data units
n           ; polarity
0           ; status
8192.000000  ; maximum gain
8388607.000000 ; clipping value
0.001907    ; conversion to mvolts
4           ; channel

```

```

32                                ; atod gain
10/30/03 15:19:46.000000         ; effective date
+0.000000                        ; clock correction
+0.000000                        ; station delay

$ 310 ; Instrument structure
unk                                ; network
CH24                               ; station name
_                                  ; component
0                                  ; instrument type
942                                ; inst.serial number
-32767                             ; number of components
4                                  ; channel number
_                                  ; sensor type
2                                  ; data type
-8388608                           ; void sample value
524288.000000                     ; digitizing constant
20.000000                          ; AAF corner freq.(Hz)
41.666599                          ; AAF poles
-32767.000000                     ; trans natural freq.(Hz)
-32767.000000                     ; trans damping coeff.
-32767.000000                     ; trans motion constant
30.157118                          ; amplifier gain (dB)
-32767.000000                     ; local X coord (meters)
-32767.000000                     ; local Y coord (meters)
-32767.000000                     ; local Z coord (meters)
10/30/03 15:19:46.000000         ; effective time
0.000000                          ; pre-event memory (secs)
9067                               ; trigger number
_                                  ; study ID
-32767                             ; sensor serial number

$ 7180276 ; DescripTrace structure
unk                                ; network
CH24                               ; station name
_                                  ; component
0                                  ; instrument type
10/30/03 15:19:46.798000         ; initial sample time
-32767                             ; local time diff
2                                  ; data type
_                                  ; data descriptor
0                                  ; digitized by
0                                  ; processed by
45069                              ; number of samples
50.000000                          ; samples per second
-8388607.000000                   ; minimum data value
8388607.000000                   ; maximum data value
0.000000                          ; average noise
-32767                             ; num clipped samples
+0.000000                          ; time correction
+0.000000                          ; rate correction
-2072  -2047  -1982  -2059  -1925

```

-1978 -2002 -2042 -2117 -1963

๓. 3FA12AD0.NA24 10/30/03 15:14:24

```
;SUD2ASC -Win32 Version 2.90
;Input file: C:\2001\3FA12AD0.NA24 10/30/03 15:14:24
;Output file: c:\analyseSEK\3FA12AD0.txt
;Converted @ 08/19/04 02:20:08.125
;Dateform: Month/Day
;No Data: FALSE
```

\$ 50 ; StationComp structure

```
unk ; network
NA24 ; station name
- ; component
0 ; instrument type
-32767 ; component azimuth
-32767 ; component incidence
-32767.000000 ; latitude
-32767.000000 ; longitude
-32767.000000 ; elevation, meters
- ; enclosure
0 ; annotated comment
r ; recorder type
- ; rock class
0 ; rock type
- ; site condition
-- ; sensor type
2 ; data type
d ; data units
n ; polarity
0 ; status
8192.000000 ; maximum gain
8388607.000000 ; clipping value
0.001907 ; conversion to mvolts
4 ; channel
32 ; atod gain
10/30/03 15:14:24.000000 ; effective date
+0.000000 ; clock correction
+0.000000 ; station delay
 ; long network
 ; long station
 ; long component
```

\$ 310 ; Instrument structure

```
unk ; network
NA24 ; station name
- ; component
0 ; instrument type
935 ; inst.serial number
-32767 ; number of components
4 ; channel number
- ; sensor type
2 ; data type
```



```

-8388608                ; void sample value
524288.000000          ; digitizing constant
20 000000              ; AAF corner freq.(Hz)
41.666599              ; AAF poles
-32767.000000          ; trans natural freq.(Hz)
-32767.000000          ; trans damping coeff.
-32767.000000          ; trans motion constant
30.157118              ; amplifier gain (dB)
-32767.000000          ; local X coord.(meters)
-32767.000000          ; local Y coord.(meters)
-32767.000000          ; local Z coord.(meters)
10/30/03 15:14:24.000000 ; effective time
0.000000               ; pre-event memory (secs)
6879                   ; trigger number
                        ; study ID
-32767                 ; sensor serial number
                        ; long network
                        ; long station
                        ; long component

$ 7180276 ; DescripTrace structure
unk                    ; network
NA24                   ; station name
-                       ; component
0                       ; instrument type
10 30 03 15 14 24 689000 ; initial sample time
-32767                 ; local time diff
2                       ; data type
-                       ; data descriptor
0                       ; digitized by
0                       ; processed by
45069                  ; number of samples
50 000000              ; samples per second
-8388607 000000        ; minimum data value
8388607 000000         ; maximum data value
0 000000               ; average noise
-32767                 ; num clipped samples
+0.000000              ; time correction
+0.000000              ; rate correction
                        ; long network
                        ; long station
                        ; long component

278 284 294 290 285
289 276 279 283 283

```

เหตุการณ์ที่ 6 23 พฤศจิกายน 2546

;SUD2ASC -Version 2.60

;Input file: C:\THESIS\03022\3FC0CD96.CH24 11 23 03 15:09:10

;Output file: C:\THESIS\03022\CD96.TES

;Converted @ 05/10/04 19:54:22.050

;Dateform: Month/Day

;No Data: FALSE

\$ 50 ; StationComp structure

```

unk                ; network
CH24              ; station name
-                 ; component
0                 ; instrument type
-32767            ; component azimuth
-32767            ; component incidence
-32767.000000    ; latitude
-32767.000000    ; longitude
-32767.000000    ; elevation, meters
-                 ; enclosure
0                 ; annotated comment
r                 ; recorder type
-                 ; rock class
0                 ; rock type
-                 ; site condition
-                 ; sensor type
2                 ; data type
d                 ; data units
n                 ; polarity
0                 ; status
8192.000000      ; maximum gain
8388607.000000   ; clipping value
0.001907         ; conversion to mvolts
4                 ; channel
32                ; atod gain
11/23/03 15:09:10.000000 ; effective date
+0.000000        ; clock correction
+0.000000        ; station delay

```

\$ 310 ; Instrument structure

```

unk                ; network
CH24              ; station name
-                 ; component
0                 ; instrument type
942                ; inst.serial number
-32767            ; number of components
4                 ; channel number
-                 ; sensor type
2                 ; data type
-8388608          ; void sample value
524288.000000    ; digitizing constant
20.000000         ; AAF corner freq.(Hz)
41.666599        ; AAF poles
-32767.000000    ; trans natural freq.(Hz)
-32767.000000    ; trans damping coeff.
-32767.000000    ; trans motion constant
30.157118        ; amplifier gain (dB)
-32767.000000    ; local X coord.(meters)

```

```

-32767.000000          ; local Y coord(meters)
-32767.000000          ; local Z coord(meters)
11/23/03 15:09:10.000000 ; effective time
0.000000              ; pre-event memory (secs)
2018                  ; trigger number
                      ; study ID
-32767                ; sensor serial number

$ 7180276 ; DescripTrace structure
unk                ; network
CH24               ; station name
-                  ; component
0                  ; instrument type
11/23/03 15:09:10.670000 ; initial sample time
-32767            ; local time diff
2                 ; data type
-                 ; data descriptor
0                 ; digitized by
0                 ; processed by
45069             ; number of samples
50.000000        ; samples per second
-8388607.000000  ; minimum data value
8388607.000000   ; maximum data value
0.000000         ; average noise
-32767           ; num clipped samples
+0.000000        ; time correction
+0.006000        ; rate correction
-1723  -1739  -1797  1843  -1782
-1782  -1685  -1600  1678  -1741

```

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



ภาคผนวก ข.

ตัวอย่างการวิเคราะห์

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



1. การทำข้อมูลให้เป็น text file โดยโปรแกรม SUD2ASC

```

C:\WINNT\system32\cmd.exe
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\>cd thesis
C:\thesis>cd 03022
C:\thesis\03022>dir
Volume in drive C has no label.
Volume Serial Number is C4DA-A433

Directory of C:\thesis\03022

09/11/2004  03:06p      <DIR>          .
09/11/2004  03:06p      <DIR>          ..
09/20/2003  04:05p           541,696  3F699076.CH2
08/01/1999  12:00a           70,534  ASC2SUD.EXE
08/09/2004  03:41p           177,203  Book1.txt
08/01/1999  12:00a           67,288  DECFILT.EXE
05/19/1999  12:00a          127,126  ref2suds.exe
05/12/2003  10:53p             7,140  spectra.mdl
08/09/2004  03:48p             1,381  spectrum.m
10/01/1996  05:00a           35,064  STDIR.EXE
08/01/1999  12:00a           68,276  SUD2ASC.EXE
08/01/1999  12:00a          125,050  SUDSDRUM.EXE
08/01/1999  12:00a          136,244  SUDSPLOT.EXE
10/28/2003  04:11p             475  SUDSPLOT.LOG
08/01/1999  12:00a          144,330  SUDSSPEC.EXE
08/01/1999  12:00a           76,301  SUDSTRIM.EXE
08/01/1999  12:00a           15,223  SUDSUTIL.INI
08/09/2004  12:48p          2,400,378  test1.txt
               16 File(s)          3,993,709 bytes
                2 Dir(s)      8,936,702,464 bytes free

C:\thesis\03022>sud2asc 3f699076.ch2 3f699076.tes
SUD2ASC - Version 2.60

Input file:  C:\THEESIS\03022\3F699076.CH2
Output file: C:\THEESIS\03022\3F699076.TES

Processing struct: 10, 60, ChannelSet
C:\thesis\03022>

```

รูปที่ ข-1 ตัวอย่างการใช้โปรแกรม SUD2ASC



## 2. การทำให้ text file ทำให้เป็น 1แถว

file input

0.02 45069

-2576	-2553	-2577	-2477	-2620
-2618	-2494	-2551	-2561	-2580
-2643	-2643	-2584	-2664	-2681
-2666	-2666	-2592	-2684	-2712
-2659	-2714	-2678	-2642	-2688
-2672	-2650	-2652	-2623	-2642
-2698	-2656	-2672	-2642	-2517
-2606	-2610	-2601	-2691	-2622
-2595	-2608	-2549	-2545	-2585
-2555	-2582	-2624	-2643	-2703
-2662	-2622	-2727	-2726	-2680
-2706	-2562	-2571	-2632	-2610
-2706	-2652	-2565	-2555	-2554
-2522	-2518	-2516	-2471	-2564
-2584	-2628	-2692	-2616	-2672
-2726	-2727	-2744	-2682	-2699
-2783	-2730	-2732	-2680	-2571
-2683	-2625	-2500	-2581	-2510
-2411	-2488	-2469	-2494	-2605

โปรแกรม M-file

% -----

% This program is for arranging the wave files.From Row to Column

% -----

clear all;

```

n=1;
pt_infilename=fopen('filein.txt','r');
pt_outfilename=fopen('fileout.txt','r');

for i=1:n

    in_name=fgetl(pt_infilename)
    out_name=fgetl(pt_outfilename)

    pt_in=fopen(in_name,'r');
    dt=fscanf(pt_in,'%f',[1 1]);
    n_point=fscanf(pt_in,'%f',[1 1]);

    [gm,count]=fscanf(pt_in,'%f',[5 inf]);
    [a,b]=size(gm);
    fclose(pt_in);

    pt_out=fopen(out_name,'w');
    fprintf(pt_out,'%10.6f\n',dt);
    fprintf(pt_out,'%10.6f\n',a*b);

    acc=[];
    for j=1:b
        acc= [ acc; gm(:,j) ] ;
    end

    fprintf(pt_out,'%10.6f\n',acc*((1.907*10^(-6))*100)/(32*171));
    fclose(pt_out);

```

```
    [ i count a b a*b ]  
end
```

```
fclose(pt_outfilename);
```

```
fclose(pt_infilename);
```

ผลของการใช้โปรแกรม M-file

```
0.020000  
45070.000000  
-2576.000000  
-2553.000000  
-2577.000000  
-2477.000000  
-2620.000000  
-2618.000000  
-2494.000000  
-2551.000000  
-2561.000000  
-2580.000000  
-2643.000000  
-2643.000000  
-2584.000000  
-2664.000000  
-2681.000000  
-2666.000000  
-2666.000000
```



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### 3.หาค่าความเร็วที่ผิวดินโดยการ input ชื่อ file ลงในโปรแกรม

```

clear all
data='91ACH24COL1.txt';
pt_dat=fopen(data,'r');
dat=fscanf(pt_dat,'%f',[1 45070]);

%titl='ec 1000,vvf,FL=50N,current=0@v<=20mm/s'
lim_t=20;
lim_vel=.003;
lim_acc=3;

vel=dat(1,:);
vel=vel(2900:45070);
n=length(vel);
dt=0.02;
t=dt*(1:n);

vel0=mean(vel(1:1000));

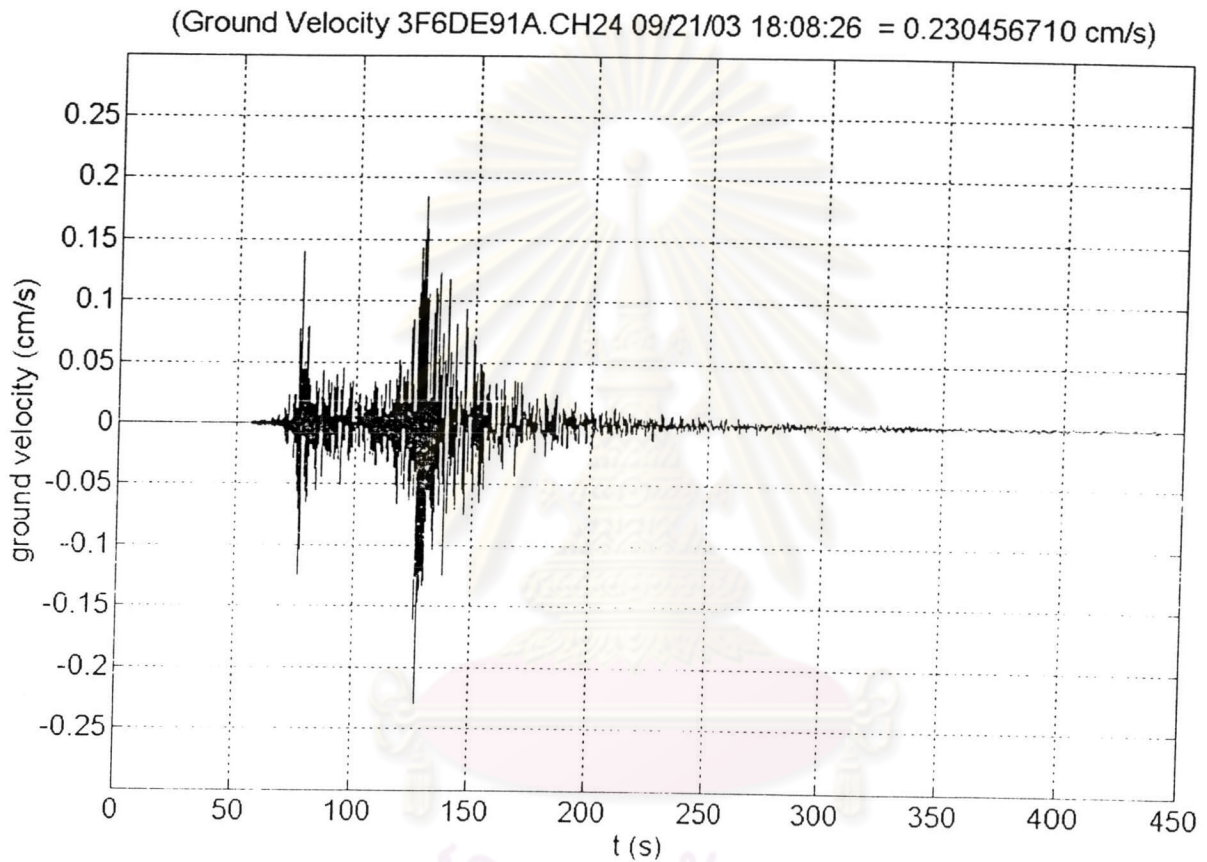
vel=(vel-vel0)*1; %mm

% Plot graph
figure(1);
plot(t,vel);
xlabel('t (s)');
ylabel('ground velocity (cm/s)');
title([' (3F69910B.CM25 09/18/03 11:03:39 = ' num2str(max(abs(vel))),'%.000000009f' '
cm/s)']);

```

```
axis([0 lim_t -lim_vel lim_vel]);
```

### 5. ผลการหาค่าความเร็วที่ผิวดิน



รูปที่ ข-2 ตัวอย่างผลการหาค่าความเร็วที่ผิวดิน



#### 4.วิเคราะห์หา สเปกตรัม

```
clear all

data='2ad0na26COL1.txt';
pt_dat=fopen(data,'r');
d1=fscanf(pt_dat,'%f',[1 15070]);
d1=d1';

% Output file
out_time = '2ad0na26COLaccss1'
out_max = '2ad0na26COLaccss1_max'

titl='2ad0na26COLaccss1'

lim_t=700;
lim_dis=.003;
lim_vel=.2;
lim_acc=3;
lim_fs=200;
lim_fd=60;
lim_bs=250;
lim_Es= 15;
lim_Ed=10;

n=length(d1);
dt=0.02;
t=dt*(1:n);
t=t';

d10=mean(d1(1:50));
```

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```

%d1=(-(d1-d10)*20;          %mm

v1=zeros(n,1);
for i = 3:n-2
    v1(i)=(-d1(i+2)+8*d1(i+1)-8*d1(i-1)+d1(i-2))/12/0.02;
end

% Write response time histories
fid=fopen([out_time '.txt'],'w');
fprintf(fid,'Time\tDisp1\tV1\n');
fprintf(fid,'%8.4ft%8.5e\t%8.5e\n',[t d1 v1]);
fclose(fid);

% Plot graph
figure(1);
subplot(211),plot(t,d1);
xlabel('t (s)');
ylabel('Ground Velocity (cm/s)');
axis([0 lim_t -lim_dis lim_dis]);

subplot(212),plot(t,v1);
xlabel('t (s)');
ylabel('Acc (cm/s^2)');
axis([0 lim_t -lim_vel lim_vel]);

```

#### ผลจากการใช้โปรแกรมในข้อ 4

0.0200	-9.00000e-005	0.00000e+000
0.0400	-8.90000e-005	0.00000e+000
0.0600	-9.00000e-005	1.04167e-005
0.0800	-8.60000e-005	-2.50000e-006
0.1000	-9.10000e-005	-1.79167e-005
0.1200	-9.10000e-005	1.45833e-005
0.1400	-8.70000e-005	5.83333e-006
0.1600	-8.90000e-005	-7.08333e-006
0.1800	-8.90000e-005	-1.25000e-006
0.2000	-9.00000e-005	-8.75000e-006
0.2200	-9.20000e-005	-6.25000e-006
0.2400	-9.20000e-005	7.91667e-006
0.2600	-9.00000e-005	-2.91667e-006
0.2800	-9.30000e-005	-9.58333e-006
0.3000	-9.30000e-005	1.25000e-006
0.3200	-9.30000e-005	-1.25000e-006
0.3400	-9.30000e-005	1.04167e-005
0.3600	-9.00000e-005	-2.50000e-006
0.3800	-9.40000e-005	-1.66667e-005
0.4000	-9.50000e-005	5.41667e-006
0.4200	-9.30000e-005	-4.16667e-007
0.4400	-9.50000e-005	-1.25000e-006
0.4600	-9.30000e-005	1.04167e-005
0.4800	-9.20000e-005	-4.16667e-006
0.5000	-9.40000e-005	-3.75000e-006
0.5200	-9.30000e-005	6.66667e-006
0.5400	-9.20000e-005	2.08333e-006
0.5600	-9.20000e-005	2.91667e-006

## 5. หาสเปกตรัมโดยใช้ FFT

```

clear all

data='adbcm24gvCOLacc1.txt';
pt_dat=fopen(data,'r');
dat=fscanf(pt_dat,'%f',[3 39570]);

x1=dat(3,:);
x2=dat(2,:);

Fs=50;

%function PlotFFT(x1, Fs);
% PLOTFFT Plot the FFT of a signal. It takes as arguments the signal and the sampling
frequency,
% and plots the FFT in a figure window.
% PlotFFT(x,Fs) Plots the magnitude of the FFT of the signal x with sampling frequency Fs
% It was derived from Technical Note 1702. For more information, please see the following
URL:
% http://www.mathworks.com/support/tech-notes/v5/1700/1702.shtml

Fn=Fs/2; % Nyquist frequency
NFFT=2.^(ceil(log(length(x1))/log(2)));
% Take fft, padding with zeros, length(FFTX)==NFFT
FFTX=fft(x1,NFFT);
NumUniquePts = ceil((NFFT+1)/2);
% fft is symmetric, throw away second half
FFTX=FFTX(1:NumUniquePts);

```

```

MX1=abs(FFTX);      % Take magnitude of X
% Multiply by 2 to take into account the fact that we
% threw out second half of FFTX above
MX1=MX1*2;
MX1(1)=MX1(1)/2; % Account for endpoint uniqueness
MX1(length(MX1))=MX1(length(MX1))/2; % We know NFFT is even
% Scale the FFT so that it is not a function of the
% length of x.
MX1=MX1/length(x1); %
f=(0:NumUniquePts-1)*2*Fn/NFFT;

max1MX1=max(abs(MX1(2:60)))
temp1=zeros(1,59);
j=0;
for i=2:60
    if MX1(i) == max1MX1;
        j=j+1;
        temp1(j)= f(i);
    end
end
f1=max(temp1)

max2MX1=max(abs(MX1(61:120)))
temp2=zeros(1,60);
j=0;
for i=61:120
    if MX1(i) == max2MX1;
        j=j+1;
        temp2(j)= f(i);
    end
end

```



```

    end
end
f2=max(temp2)

max3MX1=max(abs(MX1(121:200)))
temp3=zeros(1,80);
j=0;
for i=121:200
    if MX1(i) == max3MX1;
        j=j+1;
        temp3(j)= f(i);
    end
end
end
f3=max(temp3)
%function PlotFFT(x2, Fs);
% PLOTFFT Plot the FFT of a signal. It takes as arguments the signal and the sampling
frequency,
% and plots the FFT in a figure window.
% PlotFFT(x,Fs) Plots the magnitude of the FFT of the signal x with sampling frequency Fs
% It was derived from Technical Note 1702. For more information, please see the following
URL:
% http://www.mathworks.com/support/tech-notes/v5/1700/1702.shtml

Fn=Fs/2;          % Nyquist frequency
NFFT=2.^(ceil(log(length(x2))/log(2)));
% Take fft, padding with zeros, length(FFTX)==NFFT
FFTX=fft(x2,NFFT);
NumUniquePts = ceil((NFFT+ 1)/2);

```

```

% fft is symmetric, throw away second half
FFTX=FFTX(1:NumUniquePts);
MX2=abs(FFTX);      % Take magnitude of X
% Multiply by 2 to take into account the fact that we
% threw out second half of FFTX above
MX2=MX2*2;
MX2(1)=MX2(1)/2; % Account for endpoint uniqueness
MX2(length(MX2))=MX2(length(MX2))/2; % We know NFFT is even
% Scale the FFT so that it is not a function of the
% length of x.
MX2=MX2/length(x2);      %
f=(0:NumUniquePts-1)*2*Fn/NFFT;

figure(1);
subplot(211),plot(f,MX1);
xlabel('f (Hz)'),
ylabel('ACC(cm/s^2)'),
%axis([0 25 0 0.015]);

subplot(212),plot(f,MX2);
xlabel('f (Hz)');
ylabel('VEL(cm/s)'),
%axis([0 25 0 0.003]);

figure(2);
subplot(211),plot(x1);
%xlabel('f (Hz)');
%ylabel('MX');
%axis([0 7 0 0.3]);

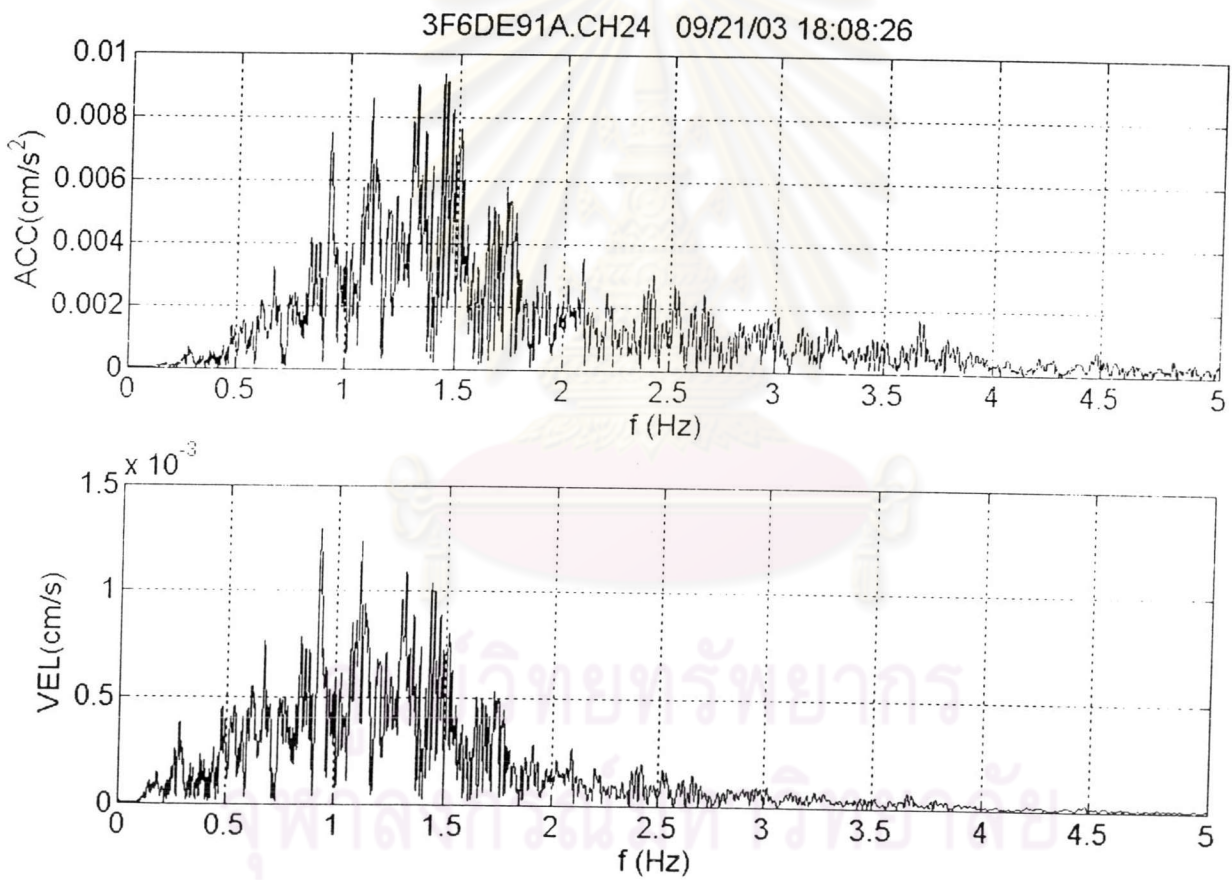
```

```

subplot(212),plot(x2);
xlabel('f (Hz)');
ylabel('MX');
axis([0 7 0 0.5]);

```

### ผลการสเปกตรัม



รูปที่ ข-3 ตัวอย่างผลการทำ FFT

## 6. โปรแกรมการหาค่าความเร่งโดยวิธี central difference method

```

clear all
data='adbcm26gvCOI1.txt';
pt_dat=fopen(data,'r');
d1=fscanf(pt_dat,'%f',[1 39570]);
d1=d1';
% Output file
out_time = 'adbcm26gvacc1'
out_max = 'adbcm26gvacc_max'

titl='adbcm26gvacc'
lim_t=60;
lim_dis=.3;
lim_vel=3;
lim_acc=3;
lim_fs=200;
lim_fd=60;
lim_bs=250;
lim_Es=15;
lim_Ed=10;

n=length(d1);
dt=0.02;
t=dt*(1:n);
t=t';

d10=mean(d1(1:50));

```

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```

%d1=-d1-d10)*20;          %mm

v1=zeros(n,1);
for i = 3:n-2
    v1(i)=-d1(i+2)+8*d1(i+1)-8*d1(i-1)+d1(i-2))/12/0.02;
end

% Write response time histories
fid=fopen([out_time '.txt'],'w');
fprintf(fid,'Time\tDisp1\tV1\n');
fprintf(fid,'%8.4ft%8.5e\t%8.5e\n',[t d1 v1]);
fclose(fid);

% Plot graph
figure(1);
subplot(211),plot(t,d1);
xlabel('t (s)');
ylabel('Ground Velocity (cm/s)');
axis([0 lim_t -lim_dis lim_dis]);

subplot(212),plot(t,v1);
xlabel('t (s)');
ylabel('Acc (cm/s^2)');

```



## ประวัติผู้เขียนวิทยานิพนธ์

นายปราธนา บุญชาญ เกิดเมื่อวันที่ 7 พฤษภาคม พ.ศ. 2515 ที่จังหวัดสกลนคร สำเร็จการศึกษา พยาบาลศาสตร์(ระดับต้น) จากวิทยาลัยพยาบาลศรีรัตนูปการศึกษาศึกษา 2538 ปริญญาวิศวกรรมศาสตรบัณฑิต สาขาวิชาวิศวกรรมโยธา จากมหาวิทยาลัยเกษมบัณฑิต เมื่อปี การศึกษา 2543 และได้เข้าศึกษาต่อในหลักสูตรวิศวกรรมศาสตรมหาบัณฑิต สาขาวิชาวิศวกรรมโยธา ที่จุฬาลงกรณ์มหาวิทยาลัย เมื่อปีการศึกษา 2545 ปัจจุบันรับราชการตำแหน่งพยาบาลเทคนิค 5 ที่โรงพยาบาลราชวิถี กรุงเทพมหานคร



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