NDAS2D 算例 eeev3

附加阻尼器的十层框架结构如图 1 示，长度单位为英寸、力单位为磅力、质量单位为磅。假定框架本身没有阻尼，阻尼器的阻尼值为，阻尼器的刚度与框架侧移刚度相比可忽略不计。将原框架结构与附加阻尼器的框架同时计算，输入数据如下，NDAS2D 数据检查后显示的结构简图如图 2 示。国际单位制的数据及结果见参考文献。

```
EEEV3 add 10kc damper
44,2
COOR
1,0,0,2
21,0,1440,0
2,240,0,2
22,240,1440,0
23,700,0,2
43,700,1440,0
24,940,0,2
44,940,1440,0
0/
0/
NQDP
1,333,1
3,111,2
21,111,0
4,211,2
22,211,0
23,333,1
25,111,2
43,111,0
26,211,2
44,211,0
0/
0/
SORT
1
MAST
4,4,1,3
6,6,1,5
8,8,1,7
10,10,1,9
12,12,1,11
14,14,1,13
16,16,1,15
18,18,1,17
20,20,1,19
22,22,1,21
26,26,1,25
28,28,1,27
30,30,1,29
32,32,1,31
34,34,1,33
36,36,1,35
38,38,1,37
40,40,1,39
42,42,1,41
44,44,1,43
0/
MASS
3,22,1,0.17096,0,0
25,44,1,0.17096,0,0
0/
EIGE
6,0.0001
ELEM
2
1,29000,1E-5,34.00,1286.8,4,4,2,0,0,0
2,29000,1E-5,25.00,984,4,4,2,0,0,0
3,29000,1E-5,20.00,800.6,4,4,2,0,0,0
```

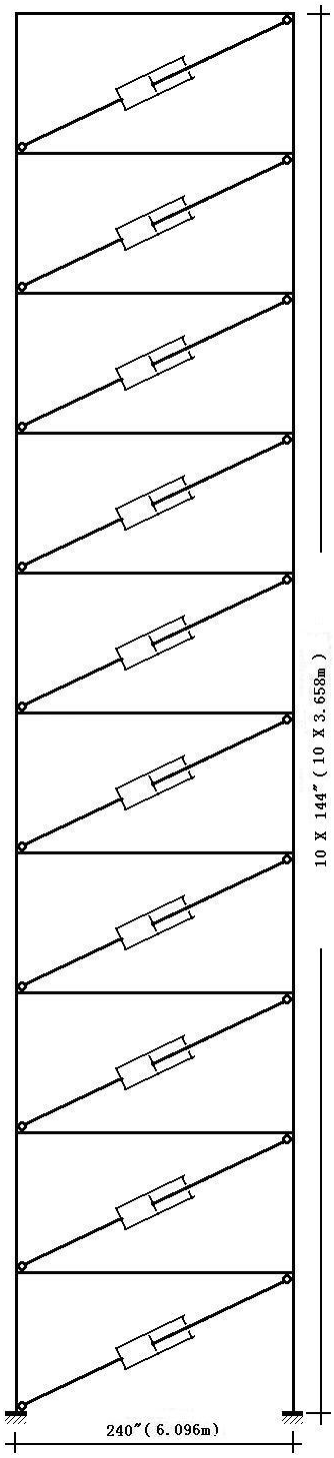

图 1　结构及构件布置

```
4,29000,1E-5,54.07,2274.8,4,4,2,0,0,0
5,29000,1E-5,34.99,1373.1,4,4,2,0,0,0
6,29000,1E-5,30.26,1165.8,4,4,2,0,0,0
7,29000,1E-5,22.94,851.2,4,4,2,0,0,0
8,29000,1E-5,15.59,542.1,4,4,2,0,0,0
9,29000,1E-5,10.00,339.2,4,4,2,0,0,0
0/
0/
1,1,5778,-5778,0,0,0,0,0,0
2,1,4413.6,-4413.6,0,0,0,0,0,0
3,1,3628.8,-3628.8,0,0,0,0,0,0
4,2,12150,-12150,1940,1940,1,0.15,1,0.15
5,2,7592.4,-7592.4,1260,1260,1,0.15,1,0.15
6,2,6548.4,-6548.4,1090,1090,1,0.15,1,0.15
7,2,4824,-4824,825,825,1,0.15,1,0.15
8,2,3135.6,-3135.6,561,561,1,0.15,1,0.15
9,2,1962,-1962,360,360,1,0.15,1,0.15
0/
0/
 1, 3, 4,0,1,0,1,1,0,1,0,0
 2, 5, 6,2,2,0,2,2,0,1,0,0
 6,13,14,2,3,0,3,3,0,1,0,0
11, 1, 3,0,4,0,4,4,1,1,0,0
12, 3, 5,2,5,0,5,5,1,1,0,0
14, 7, 9,2,6,0,6,6,1,1,0,0
16,11,13,2,7,0,7,7,1,0,0,0
18,15,17,2,8,0,8,8,1,0,0,0
20,19,21,0,9,0,9,9,1,1,0,0
21, 2, 4,0,4,0,4,1,1,0,0,0
22, 4, 6,2,5,0,5,5,1,0,0,0
24, 8,10,2,6,0,6,6,1,0,0,0
26,12,14,2,7,0,7,7,1,0,0,0
28,16,18,2,8,0,8,8,1,0,0,0
30,20,22,0,9,0,9,9,1,0,0,0
31,25,26,0,1,0,1,1,0,1,0,0
32,27,28,2,2,0,2,2,0,1,0,0
36,35,36,2,3,0,3,3,0,1,0,0
41,23,25,0,4,0,4,4,1,1,0,0
42,25,27,2,5,0,5,5,1,1,0,0
44,29,31,2,6,0,6,6,1,1,0,0
46,33,35,2,7,0,7,7,1,0,0,0
48,37,39,2,8,0,8,8,1,0,0,0
50,41,43,0,9,0,9,9,1,1,0,0
51,24,26,0,4,0,4,1,1,0,0,0
52,26,28,2,5,0,5,5,1,0,0,0
54,30,32,2,6,0,6,6,1,0,0,0
56,34,36,2,7,0,7,7,1,0,0,0
58,38,40,2,8,0,8,8,1,0,0,0
60,42,44,0,9,0,9,9,1,0,0,0
0/
1
1,280,0.005,1,1e9,1e-9,0
0/
1,1,4,2,1,0,0,0
10,19,22,0,1,0,0,0
0/
DAMP
0,0,0
DAMK
15
2
1,10,1
0/
0/
LOAD
1
0
3,22,1,0,-22,0
```

```
25,44,1,0,-22,0
0/
1
MAXX
100
DPRX
11,21,10
33,43,10
0/
PLOT
43,1
21,1
PENV
700,
EQRA
1,700,700,0.01,1152,0,0
EATX
126
0.0,0.0108,0.042,0.0010,0.097,.0159,0.161,-.0001, .221,0.0189
```

地震波数据与算例一同，略

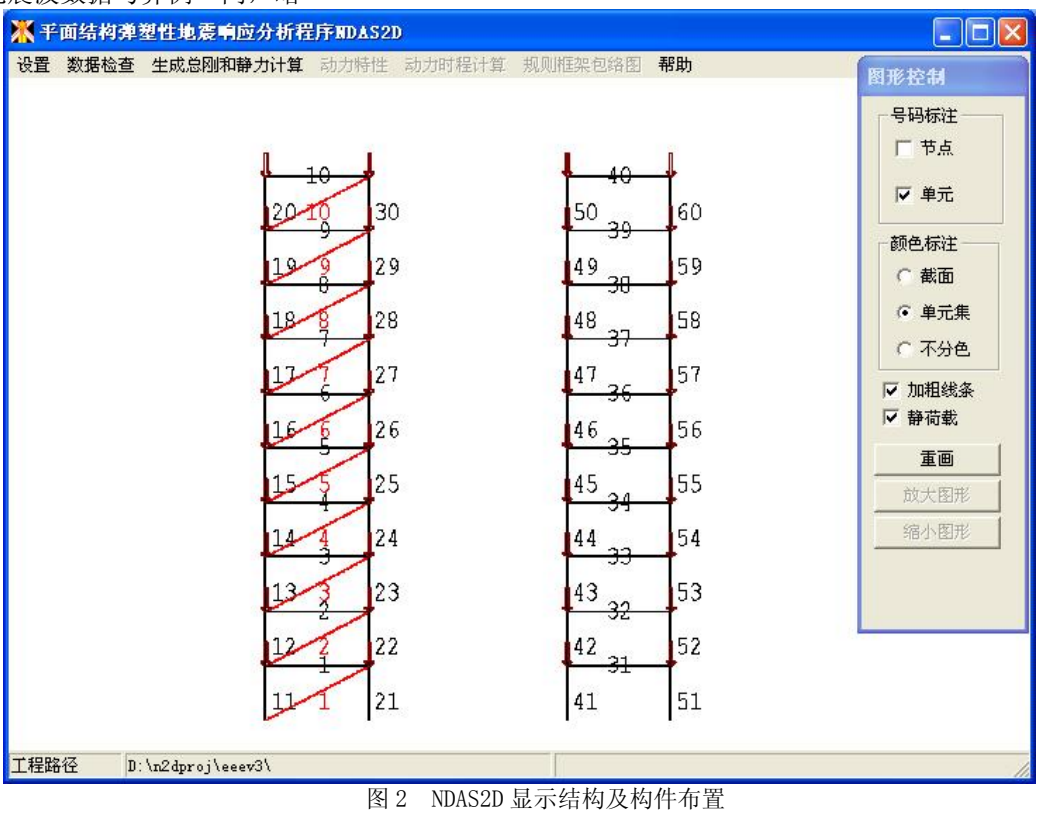

图 2　NDAS2D 显示结构及构件布置

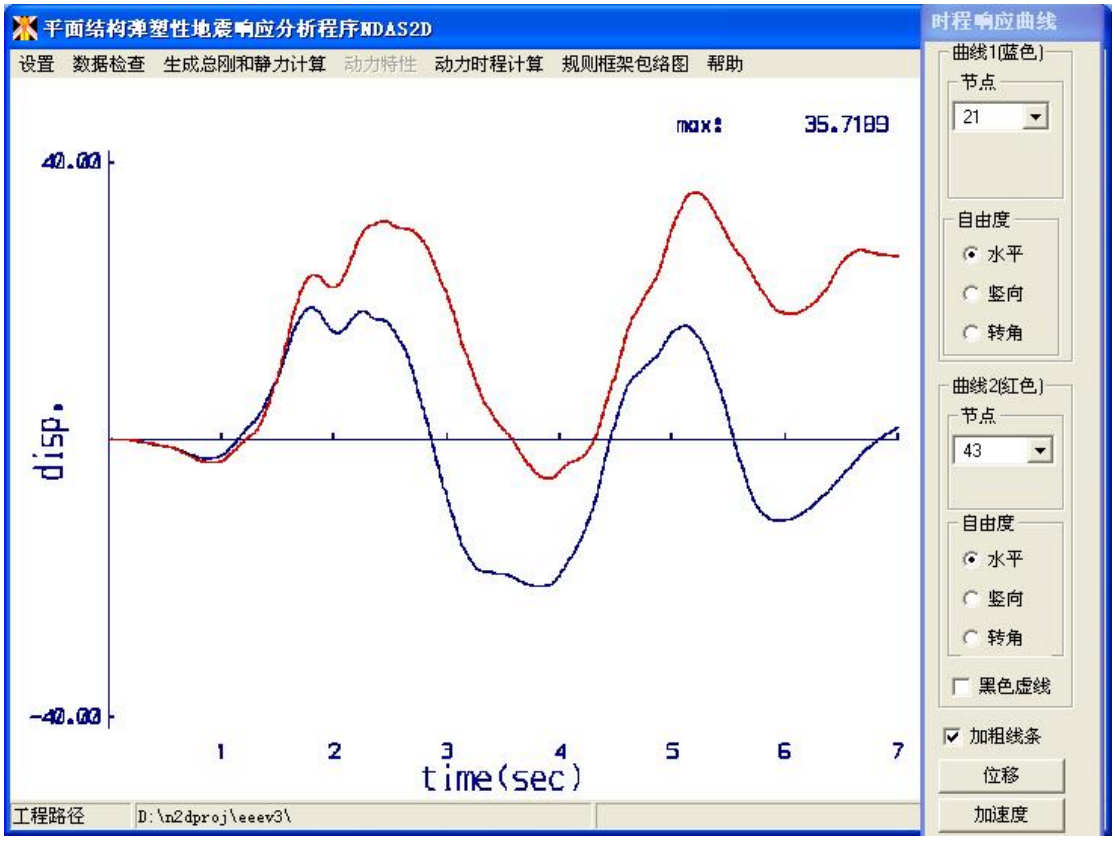

图 3　NDAS2D 显示的原框架结构与附加阻尼器的框架水平位移响应曲线

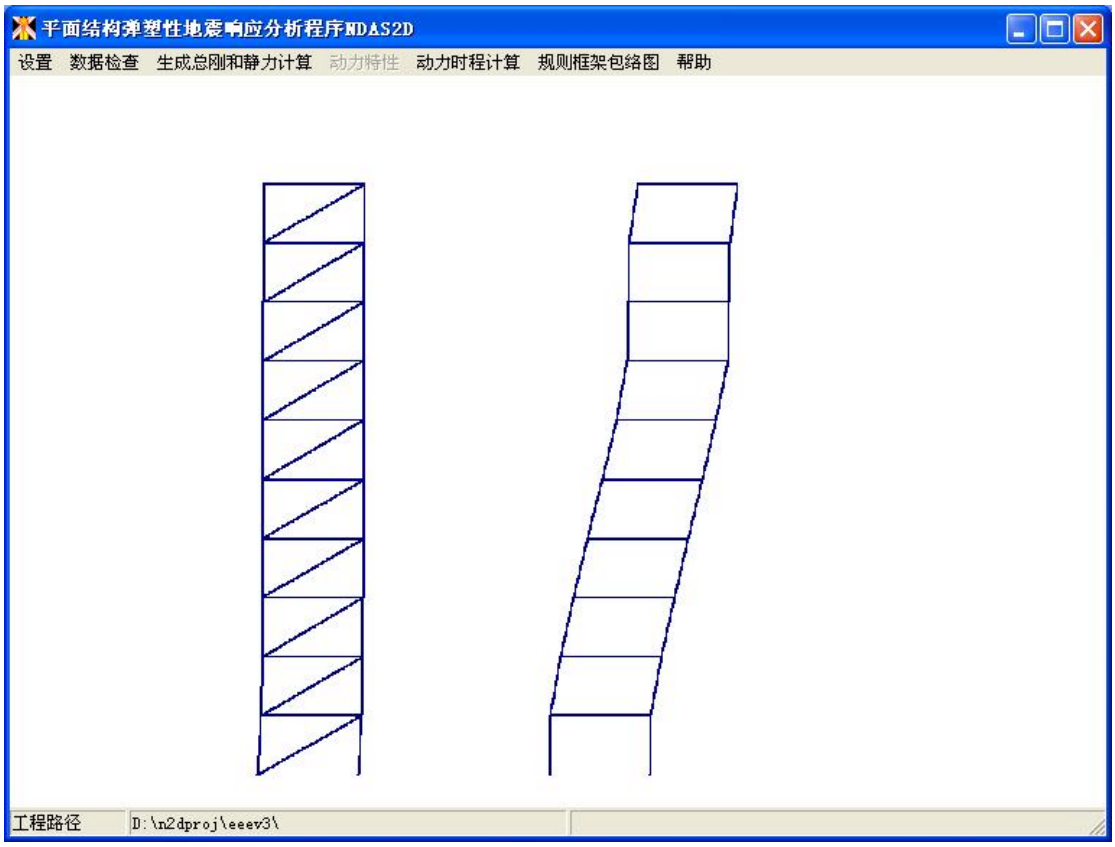

图 4　NDAS2D 显示的原框架结构与附加阻尼器的框架动画显示结束时刻

由图 3、图 4 比较可见，NDAS2D 软件计算结果附加阻尼器的框架几乎处于弹性状态，而原框架结构在强烈地震作用下产生了很大的残余变形。

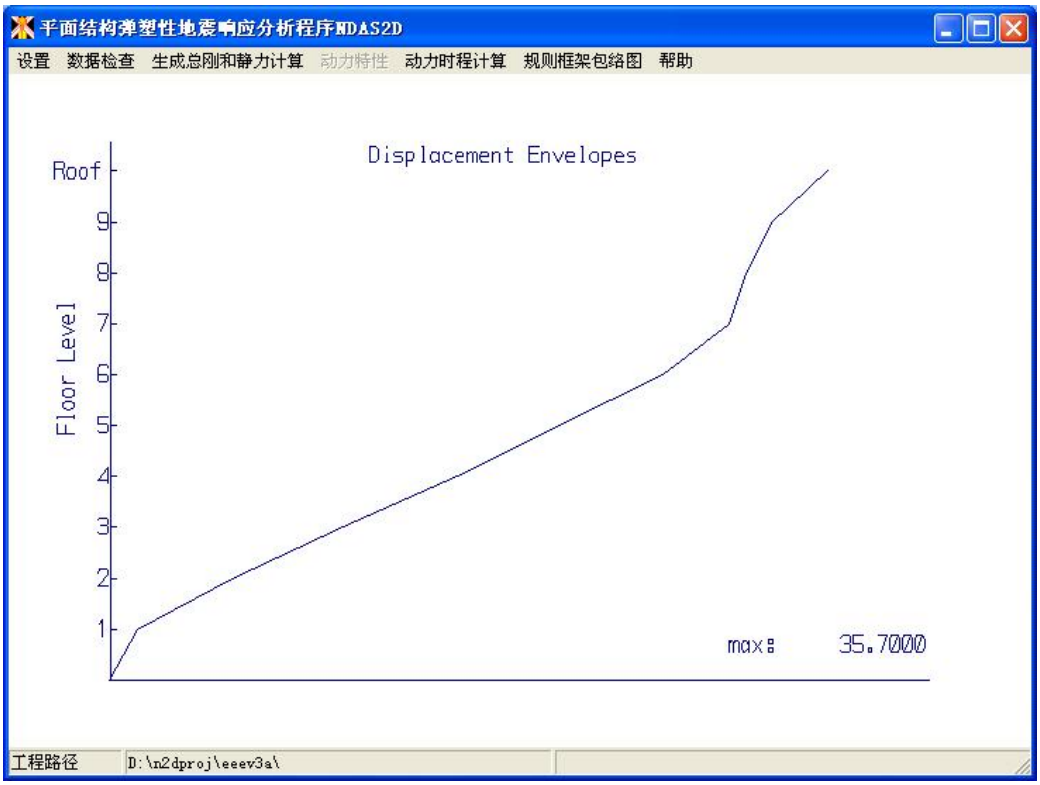

图 5　原结构位移包络

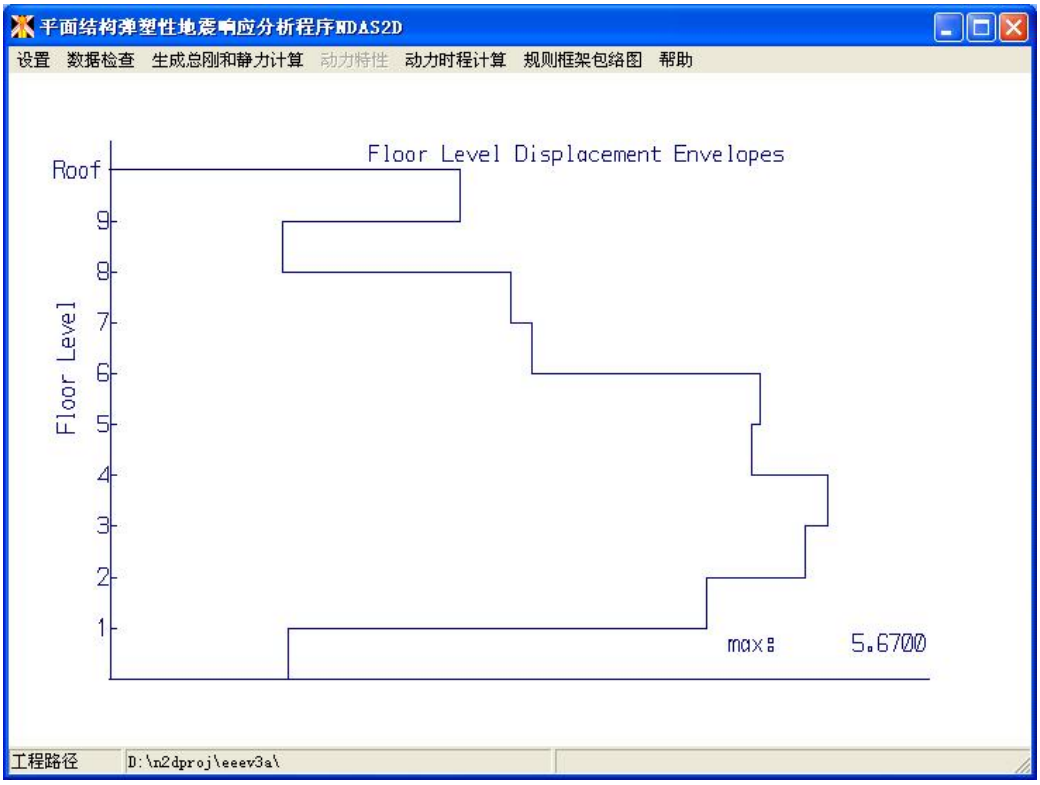

图 6　原结构层间位移包络

由于此两结构同时计算题目不属于规则结构，如欲画出层剪力、总体及层侧移、层位移角等位移、内力包络图还需将此题目分成两个单独结构来计算。以下是单独计算结果的位移、

内力包络图。

图 7　原结构层间位移角包络

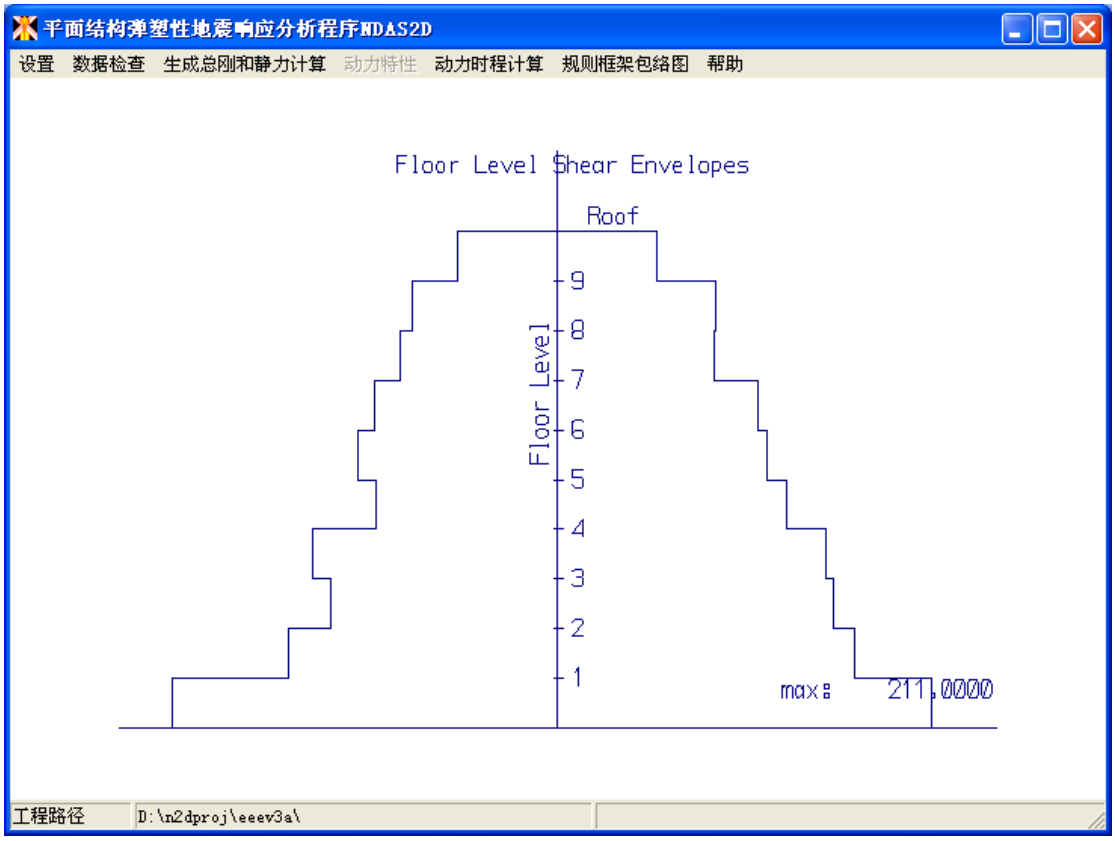

图 8　原结构层间剪力包络

由于目前软件还未将斜撑和阻尼力加入到层剪力计算之中，故加入阻尼器结构的层剪力

图还不能给出。

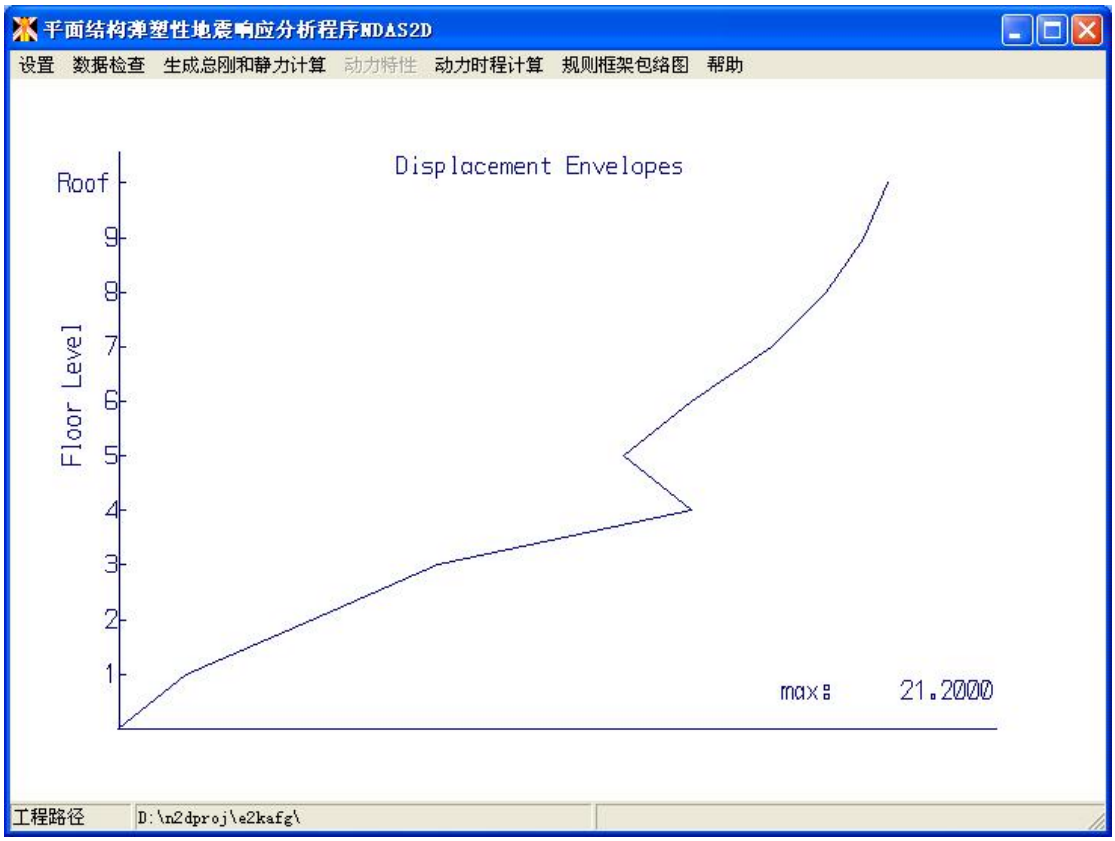

图 9　附加阻尼器结构位移包络

图 10　附加阻尼器结构层间位移包络

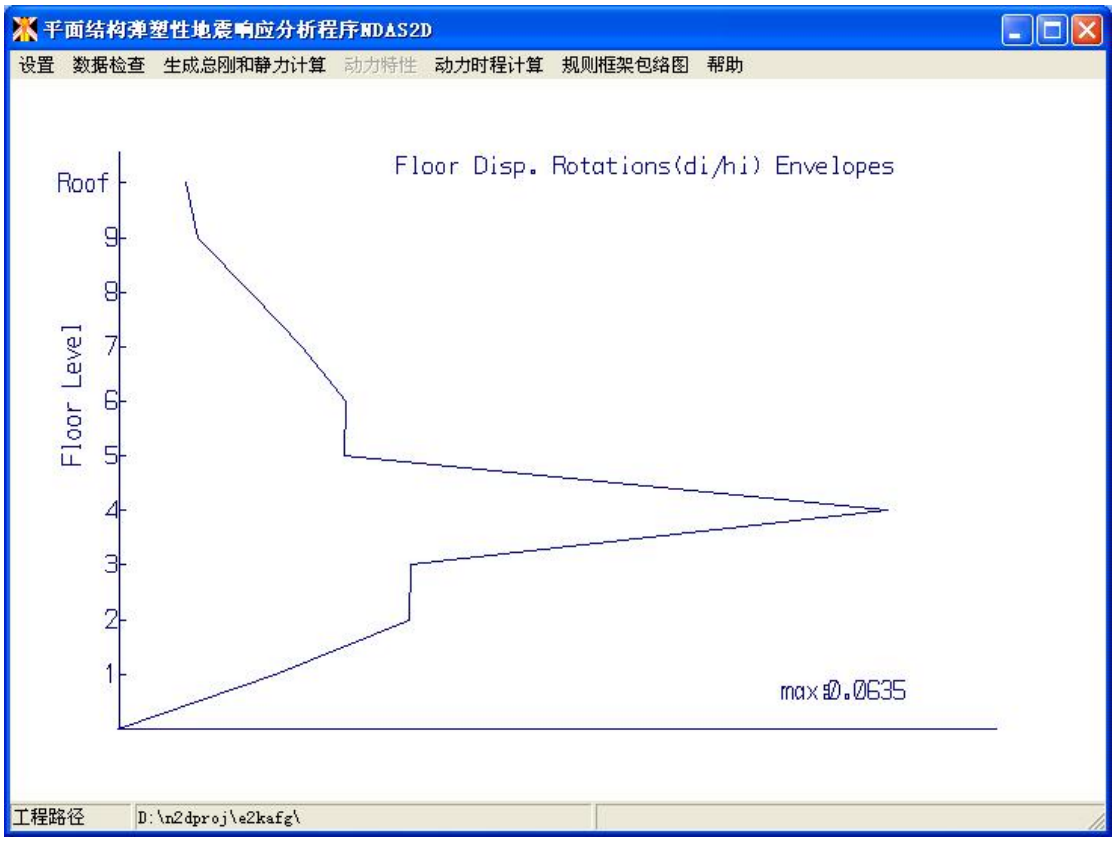

图 11　附加阻尼器结构层间位移角包络

参考文献

王依群、李忠献："不同阻尼特性材料组合结构的弹塑性动力时程响应计算"，«地震工程与工程振动»第 19 卷 2 期，76-80 页，1999 年