

～12. 偏微分方程式 その2～

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1 Python スクリプト

```
1 import math
2 N = 300
3 ex = []
4 hy = []
5
6 T = int(input())
7 for i in range(N):
8     ex.append(0)
9     hy.append(0)
10
11 for t in range(T+1):
12     for i in range(N):
13         ex[i] = ex[i] + (hy[i-1] - hy[i])/2
14     ex[int(N/2)] = math.exp(-0.5*(40-t)*(40-t)/144)
15     for i in range(N-1):
16         hy[i] = hy[i] + (ex[i] - ex[i+1])/2
17
18 for i in range(N):
19     print(i, end=" ")
20     print(ex[i])
```

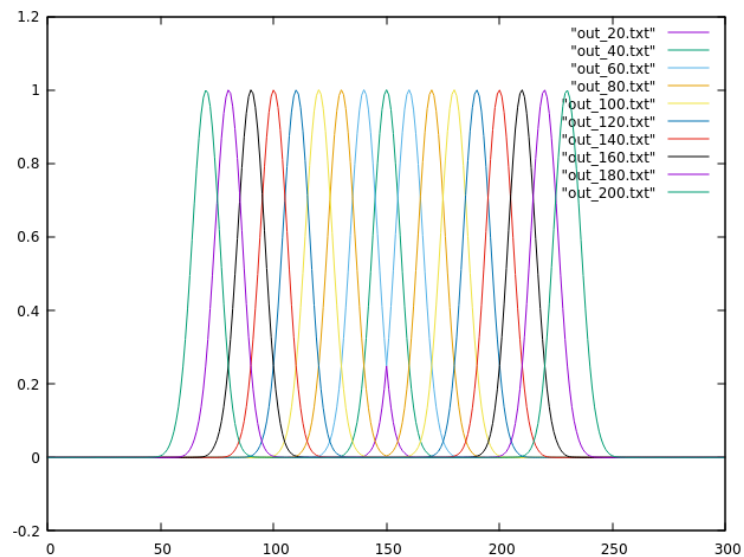


Figure 1: 電場の伝搬

```

1  import math
2  N = 300
3  ex_old = []
4  ex_now = []
5  ex_new = []
6
7  T = int(input())
8  for i in range(N):
9      ex_old.append(0)
10     ex_now.append(0)
11     ex_new.append(0)
12
13  for t in range(1,T+1,1):
14      ex_now[int(N/2)] = math.exp(-0.5*(40-t)*(40-t)/144)
15      for i in range(2,N-1,1):
16          ex_new[i] = 2*ex_now[i] - ex_old[i] \
17              + (ex_now[i-1] - 2*ex_now[i] + ex_now[i+1])/4
18      for i in range(1,N,1):
19          ex_old[i] = ex_now[i]
20          ex_new[i] = ex_new[i]
21
22  for i in range(N):
23      print(i, end=" ")
24      print(ex_now[i])

```

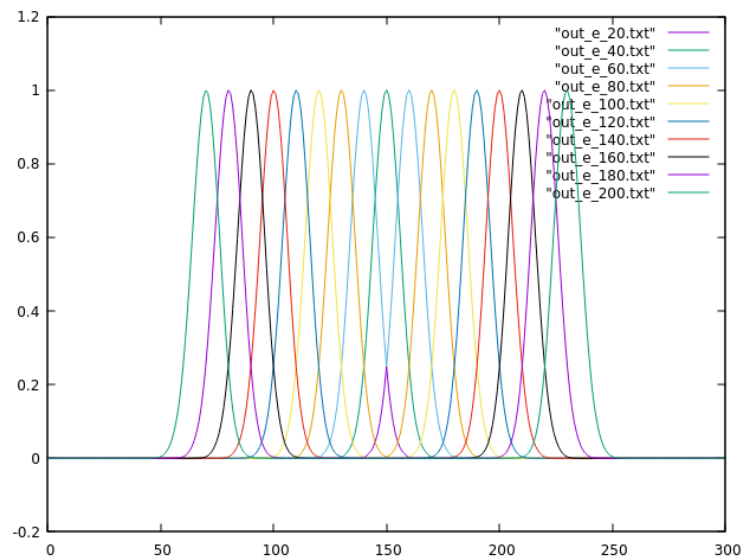


Figure 2: 電場の伝搬

## 2 2次元拡張の例

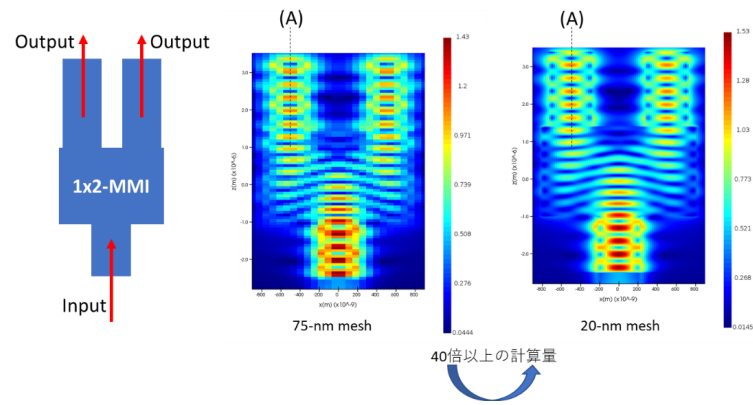


Figure 3: 時間領域差分法計算例 (2D)

### 3 3次元拡張の例

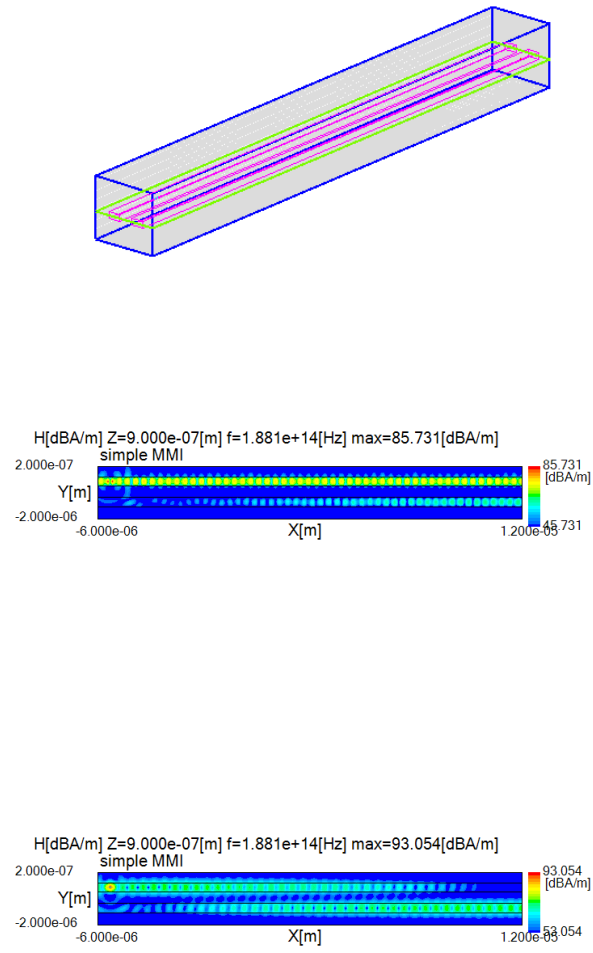


Figure 4: 時間領域差分法計算例 (3D)