普物实验报告

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摘要

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关键词：

1 实验目的

2 实验器材

3 实验过程及数据整理

4 分析与讨论

5 收获与感想

6 python 源代码

```python
import numpy as np
import matplotlib.pyplot as plt
filename = '三縫.txt'
pos = []
Efield = []
list1=[]
list2=[]
with open(filename, 'r') as file_to_read:
while True:
lines = file_to_read.readline() # 整行读取数据
if not lines:
break
pass
p_tmp, E_tmp = [float(i) for i in lines.split()]
pos.append(p_tmp)
Efield.append(E_tmp)
pass
```

```
18  pos = np.array(pos) # 将数据从list类型转换为array类型。
19  Efield = np.array(Efield)
20  l=[[] for i in range(100)]
21  m=361.14
22  n=29.9066
23  e=0.00064
24  c=0.227733
25  w=0.553067
26  k=0
27  g=0
28  def residual_function(a,d):
29  s=0
30  i=0
31  while i <=13999:
32  s+=(Efield[i]-m*(((np.sin(a*(pos[i]-n)))/(a*(pos[i]-n)))**2)*(((
        np.sin(d*3*(pos[i]-n)))/(np.sin(d*(pos[i]-n))))**2))**2
33  i+=1
34  return s
35  while k<=99:
36  j=0
37  while j<=99:
38  l[k].append(residual_function(c+j*e,w+k*e))
39  j+=1
40  k+=1
41  while g<=99:
42  list1.append(min(l[g]))
43  list2.append(l[g].index(min(l[g])))
44  g+=1
45  q=list1.index(min(list1))
46  p=list2[q]
47  print(p,q)
48  x1=np.linspace(0,70,14000)
49  y1=9*m*(((np.sin((c+p*e)*(x1-n)))/((c+p*e)*(x1-n)))**2)
50  x2=np.linspace(0,70,14000)
```

```
51  y2=m*(((np.sin((c+p*e)*(x2-n)))/((c+p*e)*(x2-n)))**2)*(((np.sin((
        w+q*e)*3*(x2-n)))/(np.sin((w+q*e)*(x2-n))))**2)
52  plt.plot(pos,Efield,'orange')
53  plt.plot(x2,y2,'black',linestyle='--')
54  plt.plot(x1,y1,'r',linestyle='--')
55  plt.xlabel('$\Delta x/mm$')
56  plt.ylabel('$I$')
57  plt.grid()
58  plt.text(57,2880,'xScatter\n---FitLine\n---EnvelopingLine',size =
        8,family = "fantasy",style = "italic",bbox = dict(alpha =
        0.2))
59  plt.show()
```

参考文献

[1] Pontryagin, L. S., V. G. Boltyanskii, R. V. Gamkrelize, and E. F. Mishchenko, The Mathematical Theory of Optimal Processes, New York, Wiley, 1962.

[2] Miller Neilan, Rachael & Lenhart, Suzanne. (2010). An Introduction to Optimal Control with an Application in Disease Modeling. DIMACS Series in Discrete Mathematics. 75. 10.1090/dimacs/075/03.

[3] J. R. Norris, Markov Chains. Cambridge;New York;: Cambridge University Press, 1997no. 2?.

[4] Gumel AB, Lenhart S (2010) Modeling paradigms and analysis of disease transmission models, vol 75. American Mathematical Society, Providence