Лабораторная 2 Применение методов интерполяции.

Выполните интерполяцию данных для комплексного показателя преломления соответствующих материалов в оптической области спектра. Постройте полученные интерполяционные функции ( зависимости от длины волны) для реальных и мнимых частей показателя преломления в диапазоне 0.3-1.2 микрон. Отметьте на этих графиках экспериментальные значения. Обсудите поведение полученных спектров за пределами экспериментальных данных по длине волны. Постройте также спектр (зависимость от длины волны) комплексной диэлектрической проницаемости .

Refractive index:

1. Gold (AU)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength (in microns) | 0.4 | 0.5 | 0.652 | 0.73 | 0.85 | 0.918 | 1.033 |
| Real part n | 1.65 | 0.916 | 0.166 | 0.164 | 0.198 | 0.222 | 0.272 |
| Imaginary part k | 1.956 | 1.840 | 3.15 | 4.35 | 5.63 | 6.168 | 7.07 |

1. Silver (Ag)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength (in microns) | 0.405 | 0.5 | 0.664 | 0.75 | 0.85 | 0.918 | 1.033 |
| Real part n | 0.173 | 0.13 | 0.14 | 0.146 | 0.152 | 0.18 | 0.22 |
| Imaginary part k | 1.95 | 2. 974 | 4.15 | 4.908 | 5.72 | 6.183 | 6.99 |

1. Cromium (Cr) (data source 1)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength (in microns) | 0.405 | 0.5 | 0.664 | 0.75 | 0.85 | 0.918 | 1.033 |
| Real part n | 1.48 | 2.49 | 3.48 | 3.84 | 4.31 | 4.42 | 4.5 |
| Imaginary part k | 3.54 | 4.44 | 4.36 | 4.37 | 4.32 | 4.3 | 4.2 |

1. Chromium (Cr) (data source 2)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength (in microns) | 0.405 | 0.5 | 0.664 | 0.75 | 0.85 | 0.918 | 1.033 |
| Real part n | 1.55 | 1.78 | 2.29 | 2.65 | 3.08 | 3.23 | 3.35 |
| Imaginary part k | 2.15 | 2.39 | 3.05 | 3.24 | 3.31 | 3.26 | 3.3 |

1. Iron (Fe)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Wavelength (in microns) | 0.62 | 0.653 | 0.729 | 0.827 | 0.954 | 1.03 | 1.13 |
| Real part n | 2.86 | 2.89 | 2.98 | 3.05 | 3.16 | 3.24 | 3.33 |
| Imaginary part k | 3.36 | 3.37 | 3.52 | 3.77 | 4.07 | 4.26 | 4.62 |

Appendix 1

#include<iostream>

using namespace std;

int main ()

{

double z,fun,x[100], f[100],l[100] ;

int N,i,j;

cout<<"give number of exp points"<<endl;

cin>>N;

cout<<"now give the following number of points for x "<<N<<endl;

for(i=0;i<N;i++)

{

cin>>x[i];

}

cout<<"now give the following number of points for f "<<N<<endl;

for(i=0;i<N;i++)

{

cin>>f[i];

}

cout<<"input intermidiate point between "<<x[0]<<" and "<<x[N-1]<<endl;

cin>>z;

for(i=0;i<N;i++)

{

l[i]=1;

for(j=0;j<N;j++)

{

if(j!=i)

l[i]=l[i]\*((z-x[j])/(x[i]-x[j]));

}

fun=fun+l[i]\*f[i];

}

cout<< "interpolation in point "<<z<<" is "<<fun<<endl;

return 0;

}

Appendix 2

Working with files

1. Open files for reading

In pre-processor instractionyou will need

#include<fstream>

// define input file

ifstream input\_file("C:\\din.txt");

// open the input files and check that they could be opened

if(!input\_file.is\_open()){

cout<<"Input file could not be opened"<<endl;

return 1;

}

input\_file>>x; // reading from input file and assigning value to variable x

1. Open files for writing

// define output file

ofstream output\_file("C:\\dout.txt");

// open the output file and check that it could be opened

if(!output\_file.is\_open()){

cout<<"Output file could not be opened"<<endl;

return 1;

}

//printing a message into output file

output\_file<<"argument point x interpol function at x "<<endl;

//printing a a value of variable fun into output file

output\_file<<fun<<endl;