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0001  //By: VINAY KUMAR
0002  //ROLL NO: PH20MSCST11001
0003  //OPTICS ASSIGNMENT 3
0004
0005  //A-1
0006
0007  clear
0008  clc
0009
0010  //Taking inputs about the system of lenses from the user
0011  n=input("Enter the number of sequential
    elements(lenses) ");
0012
0013  disp("Enter the focal lengths of sequential elements in
    order");
0014  for i=1:n
0015      f(i)=input("");
0016  end
0017
0018  alpha_in=input("Enter the input angle(in radian)");
0019  x_in=input("Enter the input height");
0020  s_in=input("Enter the object distance");
0021
0022  disp("Enter the distance between lenses in order")
0023  for i=1:n-1
0024      z(i)=input("");
0025  end
0026
0027  in_vect=[alpha_in ; x_in]
0028
0029  //for generating the lens matrices
0030  function lens_mat=genlen(n)
0001      lens_mat(1,1)=1;
0002      lens_mat(1,2)=-1/f(n);
0003      lens_mat(2,1)=0;
0004      lens_mat(2,2)=1;
0005  endfunction
0006
0037  disp("The lens matrices are")
0038  for i=1:n
0039      disp(genlen(i))
0040  end
0041

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0042 //using the imaging condition
0043 function img_dist=give(s0, t)
0001     img_dist=(s0*f(t))/(s0-f(t))
0002 endfunction
0003
0047 //calculating and storing the image distance and object
    distance
0048 ob(1)=s_in
0049 for i=1:n
0050     im(i)=give(ob(i),i)
0051     if length(z)>=i then
0052         ob(i+1)=z(i)-im(i)
0053     else
0054         ob(i+1)=0
0055         disp("The image distance from the last lens of cascade
    is")
0056         disp(im(i))
0057     end
0058 end
0059
0060 //for generating the image distance matrices
0061 function img_mat=genimg(b)
0001     img_mat(1,1)=1
0002     img_mat(1,2)=0
0003     img_mat(2,1)=im(b)
0004     img_mat(2,2)=1
0005 endfunction
0006
0068 disp("The image matrices are")
0069 for i=1:n
0070     disp(genimg(i))
0071 end
0072
0073 //for generating the object distance matrices
0074 function dis_mat=genobj(a)
0001     dis_mat(1,1)=1
0002     dis_mat(1,2)=0
0003     dis_mat(2,1)=ob(a)
0004     dis_mat(2,2)=1
0005 endfunction
0006
0081 disp("The object distance matrices are")
0082 for i=1:n

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0083     disp(genobj(i))
0084 end
0085
0086 //Generating the composite matrix
0087 mat_prod=[1 0;0 1]
0088 for i=1:n
0089     fg=genimg(i)*genlen(i)*genobj(i)
0090     mat_prod=fg*mat_prod
0091 end
0092 disp("The composite matrix for whole cascade of lenses")
0093 disp(mat_prod)
0094
0095 //displaying the results
0096 disp("Angular Magnification by cascade of lenses is")
0097 disp(mat_prod(1,1))
0098 disp("Spatial Magnification by cascade of lenses is")
0099 disp(mat_prod(2,2))
0100
0101 out_vect=mat_prod*in_vect
0102
0103 disp("alpha_out is")
0104 disp(out_vect(1))
0105 disp("x_out is")
0106 disp(out_vect(2))
```