Appendix

Matlab Codes

1. The total load that the connecting rod bearing can support

```
clc
% The viscosity variation
t=10:5:60
n=t*10^-3
for j=1:11
% The engine speed variation
N=1000:500:6000
for i=1:11
% The bearing dimensions
% the bearing width
b=.02
% the bearing length
l=.065
% The cam plate diameter
d=.25
% The minimum film thickness
ho=2*10^-5
% The extent of the pressure field
w=-27.05:2:90
y=w*pi/180
% The total load that the bearing will support
u=pi*d*N(i) /60
o=.5*(y+sin(y).*cos(y))
a=(cos(y)).^2
s=0.3743*sin(y).*(a+2)
p=-6*u*n(j)*2*b*(o-s-0.03685)/(ho^2*pi)
z=((y(1))^2/4+((sin(y(1)))^2/4)+(1.1228/3)*(((cos(y(1)))^3/3)+2*cos(y(1)))-
.03685*y(1))
```

```
q=((y(59))^2/4+((sin(y(59)))^2/4)+(1.1228/3)*(((cos(y(59)))^3/3)+2*cos(y(59)))-
.03685*y(59))
W(i,j) =l*6*n(j)*u*4*b^2/(ho^2*pi)*(z-q)
end
plot(N,W(:,j))
hold on
end
hold off
a=[N
        W']
```

2. The forces which is transmitted from the piston to the connecting Rod bearing

```
clc
x=input('the piston diameter range from =')
y=input('to =')
e=input('with step=')
d=x:e:y
D=d*10^-2
% the piston area
A=pi*D.^2/4
% The pressure variation inside the combustion chamber (bar)
pc=15:5:50
for i=1:9
% The force which acting on the connecting rod bearing
f(i,:)=pc.*10^5*A(i)
plot(pc,f(i,:))
hold on
end
```

3. The pressure distribution inside the lubricant film

```
clc
% The viscosity variation
n=input('the first vicosity')
n2=input('the second vicosity')
% The extent of the pressure field
w=-27.05:2:90
N=400:400:6000
for i=1:15
% the bearing length
b=.01
% The minimum film thickness
ho=2*10^-5
y=w*pi/180
% The cam plate diameter
d=.25
% The pressure distribution inside the lubricant film
u=pi*d*N(i) /60
o=.5*(y+sin(y).*cos(y))
a=(cos(y)).^2
s=0.3743*sin(y).*(a+2)
p(i,:)=-6*u*n*2*b*(o-s-0.03685)/(ho^2*pi)
f(i,:)=-6*u*n2*2*b*(o-s-0.03685)/(ho^2*pi)
plot(w,p(i,:),w,f(i,:),'r')
hold on
end
hold off
```