CODE FOR OPTIMISATION OF SURFACE ROUGHNESS:

clear all

% Define the regression equation in uncoded units

ra = @(speed, feed, doc) -2.57 + 0.00807\*speed + 25.0\*feed + 1.29\*doc -0.000012\*speed.^2 + 21.8\*feed.^2 - 2.38\*doc.^2- 0.0444\*speed.\*feed +0.01445\*speed.\*doc - 24.9\*feed.\*doc;

Vmin=300;

Vmax=600;

Fmin=0.15;

Fmax=0.25;

Dmin=0.50;

Dmax=1.00;

p=10;

N=50;

for i=1:p

V(i)=Vmin + rand\*(Vmax-Vmin);

F(i)=Fmin +rand\*(Fmax-Fmin);

D(i)=Dmin + rand\*(Dmax-Dmin);

SR(i)=-2.57+0.00807\*V(i)+25.0\*F(i)+1.29\*D(i)-0.000012\*V(i)\*V(i)+21.8\*F(i)\*F(i)-2.38\*D(i)\*D(i)-0.0444\*V(i)\*F(i)+0.01445\*V(i)\*D(i)-24.9\*F(i)\*D(i);

end

V;

F;

D;

SR;

SRbest=min(SR);

SRworst=max(SR);

for i=1:p

if SR(i)==SRbest

k=i;

break;

end

end

for i=1:p

if SR(i)==SRworst

j=i;

break;

end

end

Vbest=V(k);

Vworst=V(j);

Fbest=F(k);

Fworst=F(j);

Dbest=D(k);

Dworst=D(j);

for n=1:N

for i=1:p

Vn(i)=V(i)+rand\*(Vbest-V(i))-rand\*(Vworst-V(i));

Fn(i) = F(i) + rand\*(Fbest - F(i)) - rand\*(Fworst - F(i));

Dn(i) = D(i) + rand\*(Dbest - D(i)) - rand\*(Dworst - D(i));

if Vn(i)< Vmin

Vn(i) = Vmin;

elseif Vn(i)> Vmax

Vn(i)= Vmax;

end

if Fn(i)< Fmin

Fn(i) = Fmin;

elseif Fn(i)>Fmax

Fn(i)= Fmax;

end

if Dn(i)<Dmin

Dn(i) = Dmin;

elseif Dn(i)> Dmax

Dn(i)= Dmax;

end

SRn(i) = -2.57 + 0.00807 \* Vn(i) + 25.0\*Fn(i)+ 1.29\*Dn(i)-0.000012\*Vn(i)\*Vn(i)+21.8\*Fn(i)\*Fn(i)-2.38\*Dn(i)\*Dn(i)-0.0444\*Vn(i)\*Fn(i)+0.01445\*Vn(i)\* Dn(i)-24.9\*Fn(i)\*Dn(i);

if SRn(i)>SR(i)

SRn(i)= SR(i);

Vn(i) = V(i);

Fn(i) = F(i);

Dn(i) = D(i);

end

end

Vn;

Fn;

Dn;

SRn;

SRnbest=min(SRn);

SRnworst=max(SRn);

for i=1:p

if SRn(i)==SRnbest

k=i;

break;

end

end

for i=1:p

if SRn(i)==SRnworst

j=i;

break;

end

end

Vbest = Vn(k);

Vworst = Vn(j);

Fbest = Fn(k);

Fworst = Fn(j);

Dbest = Dn(k);

Dworst = Dn(j);

V = Vn;

F = Fn;

D = Dn;

SR = SRn;

FF(n) = SRnbest;

itn(n) = n;

end

% Plot the graph of RA in each iteration

figure;

plot(itn, FF);

xlabel('Iteration');

ylabel('RA');

title('RA vs. Iteration');