Finite Difference Methods for Reynolds Equations

```
n=51 ;    %number of nodes
m=52;
lambda=[0 1 2 4];% lenght to width ratio, l/b
dx=2*pi/(n-1);
dy=1/((m-1));
DR=dx/dy;
X=0:dx:2*pi;
Y=0:dy:1;

for c=1:4
    l=lambda(c);
P=zeros(n,m) ; % boundary condition
H=(n:m) ;
eps=0.0001;
omega=1.8;
omega1=0.01;
ERR=1.0;
BjG=0.005;
iter=0.;
while(abs(ERR) > 0.01)
   iter=iter+1;
   eps= eps+ERR*omega1;

  for i=1:n
   for j=1:m
     H(i,j)=                    );  % film thickness profile
     if H(i,j)<0
         H(i,j)=0;
     end
   end
  end
```

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```
p_error= 1;
while(p_error>1.e-8)
 p_error = 0.;
 for i = 2:n-1;
   for j =2:m-1
     Pold = P(i,j);
     A=H(i,j);
     B=H(i+1,j);
     C=((1*DR)^2)*(A^3)/4;
     df=(A^3)+(B^3)+(2*C) ;
     P(i,j)=Pold-omega*((df*Pold-A^3*                                    -6*(dx^2)*eps*sin(i*dx))/df);
     pdiff = P(i,j)-Pold;
     if P(i,j)<0
       P(i,j)=0;
     end
     if(abs(pdiff)>p_error)
      p_error = pdiff;
     end
   end
 end
end

% load calculation
 Wx=0; Wz=0;
for i=1:n;
  for j=1:m;
   Wx=Wx+P(i,j)*dx*dy*sin(i*dx);
   Wz=Wz-P(i,j)*dx*dy*cos(i*dx);
  end
end
%total load and bearing number
 W=sqrt(Wx^2+Wz^2);
 Bj= 1/(W*pi)
 ERR = (Bj-BjG)/Bj; % percent load error
```