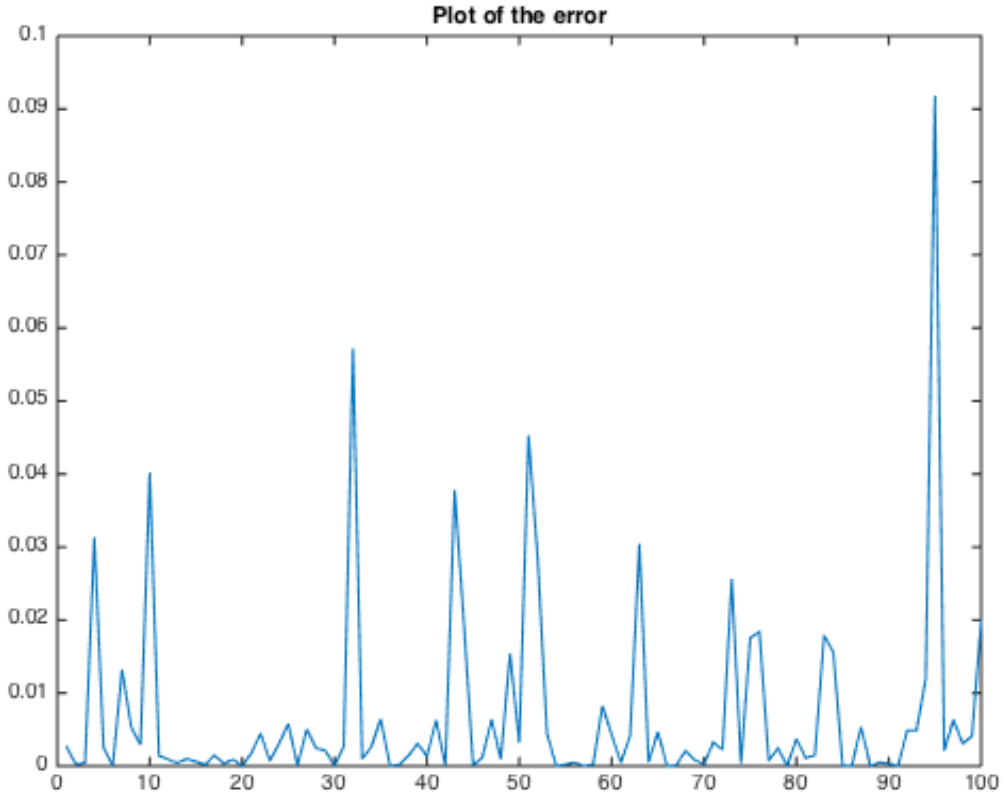
```
clear; close all;
ellip_bdry_data;

y = ones(100,1);

%Create Xhat
Xhat = zeros(100,10);
for n = 1:100
    Xtemp = [X(1,n)^2, 2*X(1,n)*X(2,n), 2*X(1,n)*X(3,n), 2*X(1,n)*X(4,n), X(2,n)^2, 2*X(2,n
)*X(3,n), 2*X(2,n)*X(4,n), X(3,n)^2, 2*X(3,n)*X(4,n), X(4,n)^2];
    Xhat(n,:) = Xtemp;
end

ahat = (Xhat'*Xhat)\Xhat'*y;
ahat = ahat';

%Least Squares
A = [ahat(1:4); [ahat(2), ahat(5:7)]; ahat(3), ahat(6), ahat(8:9); ahat(4), ahat(7), ahat(9
), ahat(10)];
J = norm(Xhat*ahat' - y)^2;

disp(['The mean squared error induced by this choice of matrix A is: ' num2str(J)]);
disp('The eigenvalues can be observed to all be postitive real values. The eigenvalues of A
:');
eig(A)
disp('The matrix A:');
A

for i = 1:100
   error(i) = (X(:,i)'*A*X(:,i) - 1)^2;
end

plot(error);
title('Plot of the error');
```

```
The mean squared error induced by this choice of matrix A is: 0.6995
The eigenvalues can be observed to all be postitive real values. The eigenvalues of A:

ans =

    0.0467
    0.4211
    1.2334
   25.6020

The matrix A:

A =

    1.4350    0.0509   -2.8708    1.6120
    0.0509    0.4143   -1.3842    0.8988
   -2.8708   -1.3842   16.1368  -11.8447
    1.6120    0.8988  -11.8447    9.3172
```



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