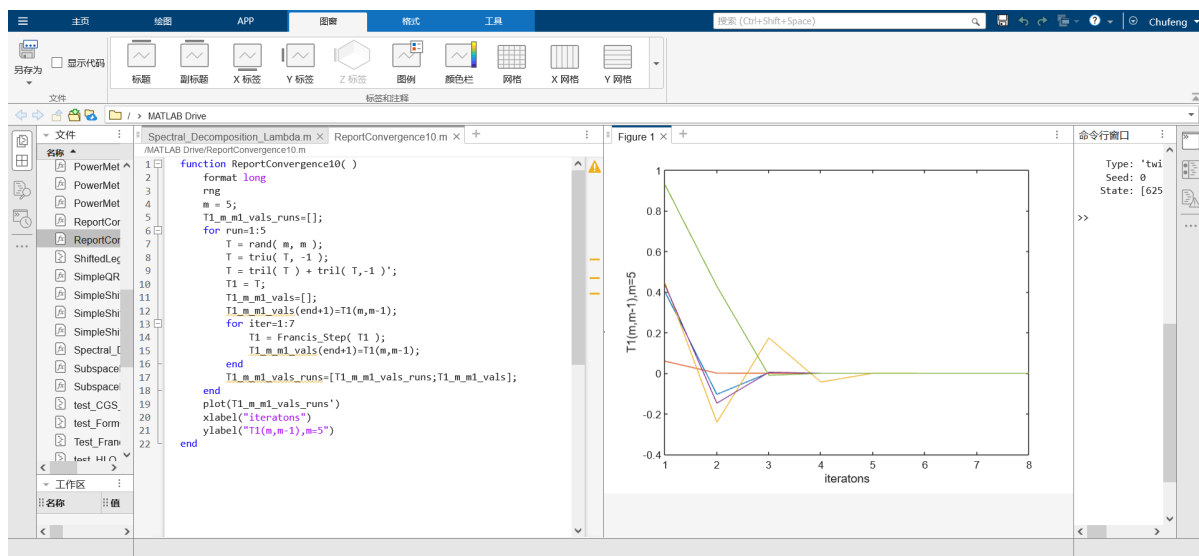


10.1 Investigate the convergence of the (m,m-1) element of matrix T_1 .

```
function ReportConvergence10( )
    format long
    rng
    m = 5;
    T1_m_m1_vals_runs=[];
    for run=1:5
        T = rand( m, m );
        T = triu( T, -1 );
        T = tril( T ) + tril( T, -1 )';
        T1 = T;
        T1_m_m1_vals=[];
        T1_m_m1_vals(end+1)=T1(m,m-1);
        for iter=1:7
            T1 = Francis_Step( T1 );
            T1_m_m1_vals(end+1)=T1(m,m-1);
        end
        T1_m_m1_vals_runs=[T1_m_m1_vals_runs;T1_m_m1_vals];
    end
    plot(T1_m_m1_vals_runs')
    xlabel("iterations")
    ylabel("T1(m,m-1),m=5")
end
```

We can see that after 4 iterations, they are becoming convergent, and convergent together at the iteration of 5.



10.2 Spectral_Decomposition_Lambda

```
function T_spectrum = Spectral_Decomposition_Lambda( T )
    T_spectrum = T;
    n = length(T);
    epsilon=1e-18;
    for i=n:-1:3
```

```
        while T_spectrum(i,i-1) > epsilon * sqrt(abs(T_spectrum(i-1,i-1))+abs(T_spectrum(i,i)))
            T_spectrum(1:i,1:i) = Francis_Step(T_spectrum(1:i,1:i));
        end
    end
    T_spectrum(1,2)=T_spectrum(2,1);
    eigs_of_UL_2b2 = eig(T_spectrum(1:2,1:2));
    T_spectrum(1,1) = eigs_of_UL_2b2(1);
    T_spectrum(2,2) = eigs_of_UL_2b2(2);
end
```