Mono Lake water-balance model in MATLAB

```matlab
    dt = 1; % years
    ts = 1937; % years
    tf = 1983; % years
    t = ts:dt:tf; % years
```

```matlab
    Q_gauged = xlsread('Mono Lake Flows 1937-1983.xlsx', 'Gauged stream', 'B2:B48','bas
    Q_diversion = xlsread('Mono Lake Flows 1937-1983.xlsx', 'Diversion', 'B2:B48','basi
    Q_ungauged = xlsread('Mono Lake Flows 1937-1983.xlsx', 'Ungauged', 'B2:B48','basic'
    P_rate = xlsread('Mono Lake Flows 1937-1983.xlsx', 'Precipitation', 'B2:B48','basic
    E_rate = xlsread('Mono Lake Flows 1937-1983.xlsx', 'Evaporation', 'B2:B48','basic')

    Survey = xlsread('Mono Lake Survey.xlsx');

    YR_measured = xlsread('MLC_Lake Levels 1850-2017.xlsx', '','A2:A169','basic');
    Z_measured = xlsread('MLC_Lake Levels 1850-2017.xlsx', '','B2:B169','basic');
    YR_measured = YR_measured + 1;

    Z0 = Z_measured(YR_measured==ts); % feet above msl
    V0 = interp1(Survey(:,3), Survey(:,1), Z0);
```

```matlab
    V_Model = zeros(size(t));
    Z_Model = zeros(size(t));

    V_Model(1) = V0;
    Z_Model(1) = Z0;

for n = 1:length(t)-1
    LakeArea = interp1(Survey(:,1), Survey(:,2), V_Model(n));
    Q_Evap = E_rate(n) .* LakeArea;
    Q_Precip = P_rate(n) .* LakeArea;

    V_Model(n+1) = V_Model(n) + (Q_gauged(n) - Q_diversion(n) + Q_ungauged(n) - Q_Evap

    Z_Model(n+1) = interp1(Survey(:,1), Survey(:,3), V_Model(n+1));
end
```

```matlab
figure
plot(t,Z_Model,'bo-')
hold on
plot(t,Z_measured(YR_measured >= ts & YR_measured <= tf),'k*')
xlabel('Year')
ylabel('Lake Surface Elevation (ft above msl)')
title('Water Balance Model of Mono Lake')
legend('forward Euler model', 'historic data')
```

```matlab
Model_Error = Z_Model - Z_measured(YR_measured >= ts & YR_measured <= tf)';
figure
plot(t,Model_Error,'r-')
```