```
// T31stEstNois.sce
// KALMAN AS A NOISE FILTER
// Experiments
// - change Rw and Rv to catch properly the signal
// - Rw ... changes of the signal
// - Rv ... changes of the noise
// ---------------------------------------------------------------------
exec("ScIntro.sce",-1),
getd(), mode(0)

// SIMULATION                                                          // 1
tt=0:.1:(2*%pi);                                                       // 2
nt=length(tt);                                                         // 3
sd=2;                                  // simulation noise             // 4
e=[sd*rand(1,nt,'n'); sd*rand(1,nt,'n')];                              // 5
g=[10*cos(tt); 15*sin(tt)];            // pure signal (ellipse)        // 6
x=g+e;                                 // measured noisy signal        // 7
                                                                       // 8
// FILTRATION                                                          // 9
Rz=1e6*eye(2,2);                       // state-estimate cov. matrix   // 10
Rw=0.01*eye(2,2);                      // state-model cov. matrix      // 11
Rv=.1*eye(2,2);                        // output-model cov. matrix     // 12
M=[1 0                                 // state-model matrices         // 13
```

```
   0 1];                                                                  // 14
A=[1 0                                                                    // 15
   0 1];                                                                  // 16
N=[0 0]';                                                                 // 17
F=[0 0]';                                                                 // 18
B=0;                                                                      // 19
G=0;                                                                      // 20
zt(:,1)=[0 0]';                          // initial state                 // 21
                                                                          // 22
for t=2:nt                                                                // 23
  [zt(:,t),Rz,yp]=Kalman(zt(:,t-1),x(:,t),0,M,N,F,A,B,G,Rw,Rv,Rz);        // 24
end                                                                       // 25
                                                                          // 26
// Results                                                                // 27
//plot(g(1,:),g(2,:),'k:')                                               // 28
plot(x(1,:),x(2,:),'b.')                                                  // 29
plot(zt(1,:),zt(2,:),'r.:')                                               // 30
legend('signal','measurements','estimate');                              // 31
```

Description of the program

The program corresponds to the previous one `T31stEst.sce` only parameters of the model are given as specified above.

Here: g is the smooth signal that we are able to measure only with noise. x is the measured noisy signal. e is the noise that we cannot see itself, only as a superposition on the smooth signal.

Rows 10–12 set the covariances of state model noise, output model noise and state estimate. The last one can be set as a diagonal matrix with large diagonal. The first two ones are crucial.

Rows 13–20 set the model parameters.

Row 24 is the Kalman filter procedure which is repetitively called in the time loop.