A user's guide for the Matlab package DataAssimilation.zip

LSZ == K. J. H. Law, A. M. Stuart, K.C. Zygalakis,
Data Assimilation: A Mathematical Introduction

The code KalmanFilter.m implements the standard Kalman Filter. It is approximately code p8.m from LSZ.

The codes `EnKF.m, ETKF.m, ParficleFilter.m` and `ParticleFilterOptimal.m` implement, respectively,
— the basic Ensemble Kalman Filter (approximately code p12.m from LSZ)
— Ensenble Transform Kalman Filter (approximately code p.13.m from LSZ)
— basic Particle Filter (SIRS) (approximately code p.14.m from LSZ)
— an optimal Particle Filter (approximately code p.15.m from LSZ)
The model is the sine map.

Files `EnKFerror.mat, ETKFerror.mat, PFerror.mat,` and `PFOerror.mat` are data files with errors for each filter. They are obtained by setting the number of steps J=1e5 in the codes `EnKF.m, ETKF.m, ParficleFilter.m` and `ParticleFilterOptimal.m` and uncommenting the line (approximately line 90)

```
save(<filename>,'e','rme');
```

in each of them.

The code `CompareFilters.m` compares the errors in the filters `EnKF.m, ETKF.m, ParficleFilter.m` and `ParticleFilterOptimal.m` applied to the sine map.
It reproduces Figures 4.12 (a) and (b) in LSZ.

The codes `EnKF_demo.m, ETKF_demo.m,` and `PF_demo.m` are demo codes for EnKF, ETKF and the basic Particle Filter respectively. To run them, keep clicking your Mose. They contain commands

```
tmp = waitforbuttonpress;
```

that allows you to take your time looking at figures corresponding to each stage of the code.