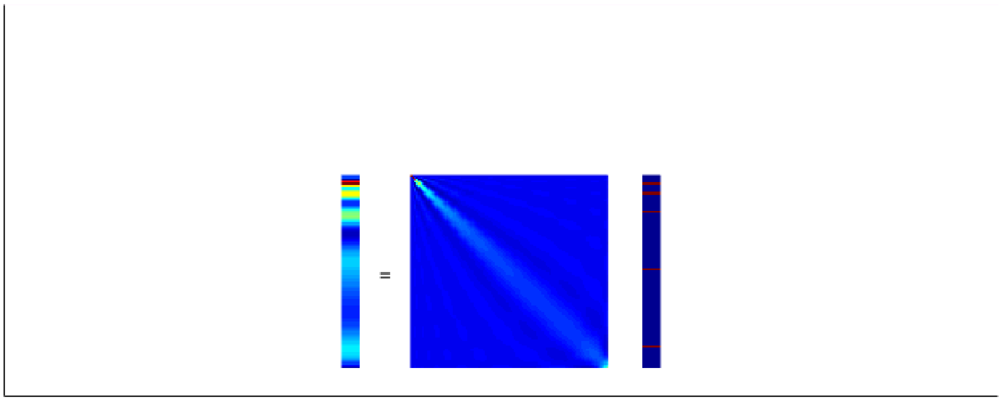
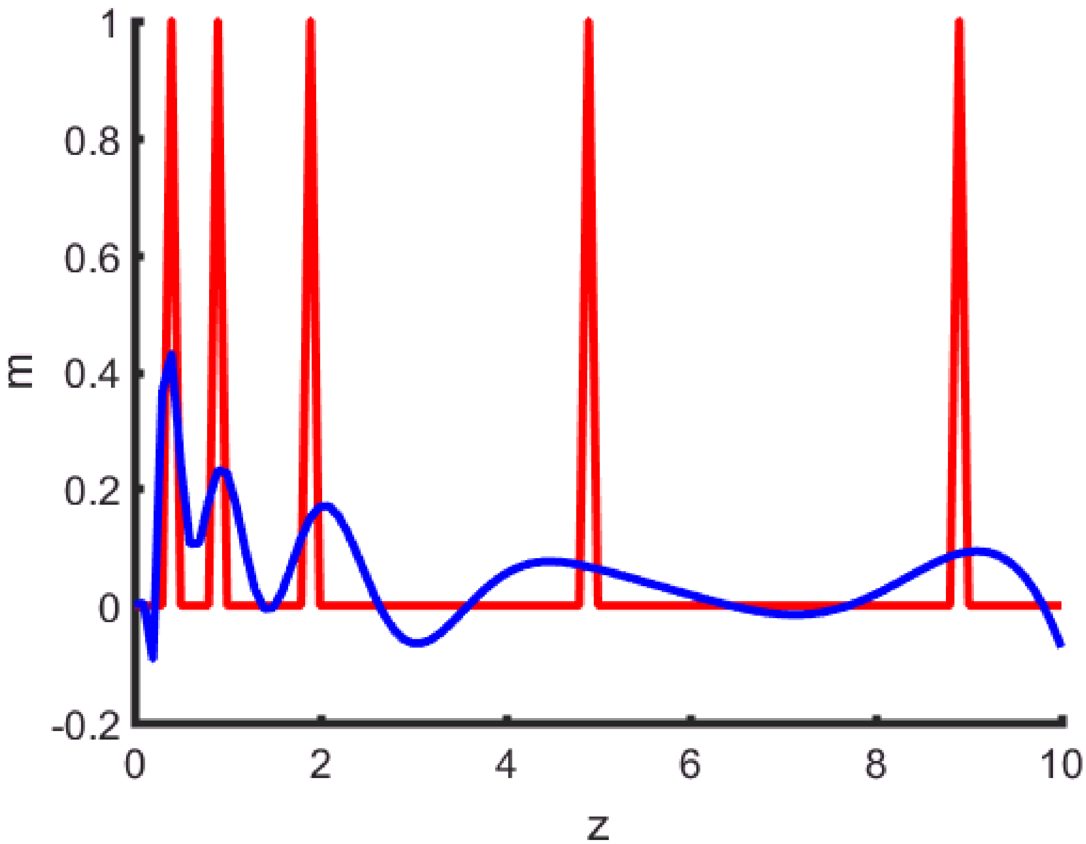
```
% gda04_02
%
% Model Resolution Matrix example
% supports Figure 4.2 and Figure 4.5

clear all;

% auxially variable z
M=101;
zmin=0;
zmax=10;
Dz=(zmax-zmin)/(M-1);
z=zmin+Dz*[0:M-1]';

% model, m(z), moztly zero but a few spikes
mtrue = zeros(M,1);
mtrue(5)=1;
mtrue(10)=1;
mtrue(20)=1;
mtrue(50)=1;
mtrue(90)=1;

% experiment: exponential smoothing of model
N=80;
cmin=0.00;
cmax=0.10;
Dc=(cmax-cmin);
c = cmin + Dc*[0:N-1]';
G = exp(-c*z'); % data kernel

% true data and synthetic observed data
sd=0.0;
dtrue = G*mtrue;
dobs = dtrue + random('Normal',0,sd,N,1);

% minimum length solution
epsilon=1e-12;
GMG = G'/(G*G'+epsilon*eye(N,N)); % generalized inverse
mest = GMG * dobs;
Rres = GMG*G; % model resolution matrix

% plot model resolution matrix
gda_draw(' ',mest,'=',' ',Rres,' ',mtrue);
```




```
% Figure 4.2 (B) Actual morel resolution matrix R for the case where the model parameters, mj(
% are related to the data through the kernel, Gij = exp(- cizj), where the cs are constants. L
% values (red colors) occur only near the top (small z) of the main diagonal (dashed line), in
% that the resolution is poor at larger values of z.

% plot
figure(2);
clf;

% plot scale
pmmin=-0.2;
pmmax=1;

% plot true and estimated model
set(gca,'LineWidth',3);
set(gca,'FontSize',14);
hold on;
axis( [zmin, zmax, pmmin, pmmax ]' );
plot( z, mtrue, 'r-', 'LineWidth', 3);
plot( z, mest,  'b-', 'LineWidth', 3);
xlabel('z');
ylabel('m');
```




```
% Figure. True solution (red) and estimated solution (blue) of the inverse problem
% used to illustrate the model resolution matrix R, above.  Note that the estimated
% solution is a smooth average of the true solution.
```