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% gda05_10
%
% examples of probability distribution p(d1,m1)
% supports Figure 5.10

clear all;

% m1 variable
Nd1 = 51;
dlmin = 0;
dlmax = 5.0;
Dm1 = (dlmax-dlmin)/(Nd1-1);
d1 = dlmin + Dm1*[0:Nd1-1]';

Nm1 = 51;
mlmin = 0;
mlmax = 5.0;
Dm1 = (mlmax-mlmin)/(Nm1-1);
m1 = mlmin + Dm1*[0:Nm1-1]';

% setup for distribution
P1=zeros(Nd1,Nm1);
mbar1 = [2.5, 2.5]';
sd1 = 0.5;
sd2 = 1;
C1 = diag( [sd1^2, sd2^2]' );
CI1 = inv(C1);
DC1 = det(C1);

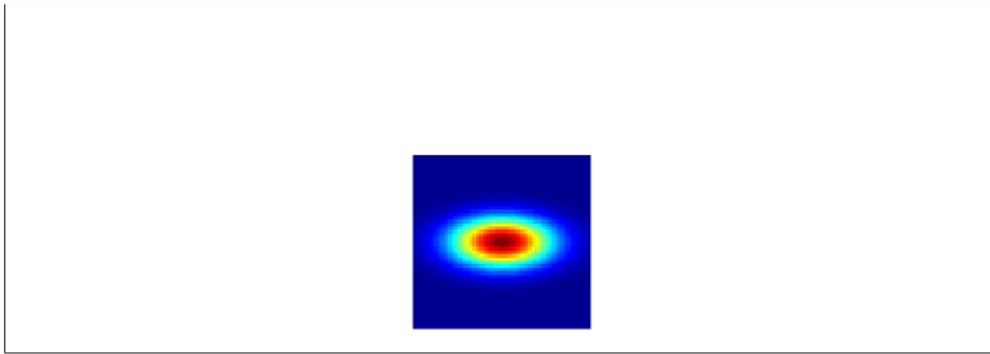
% normalization
norm1 = (1/(2*pi)) * (1/sqrt(DC1));

% tabulate distribution
for i=[1:Nd1]
for j=[1:Nm1]
    x1=[m1(i), m1(j)]' - mbar1;
    P1(i,j) = norm1*exp( -0.5 * x1'*CI1* x1 );
end
end

% for test purposes
% A1 = Dd1*Dd2*sum(sum(P1));

% plot distribution
gda_draw(' ', P1 );

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% Figure 5.10 Joint probability density function  $p_A(m, d)$  for model parameter  $m$  and datum  $d$ . The  
% is peaked at mean values  $m_{ap}$  and  $d_{obs}$ . MatLab script gda05_10.
```