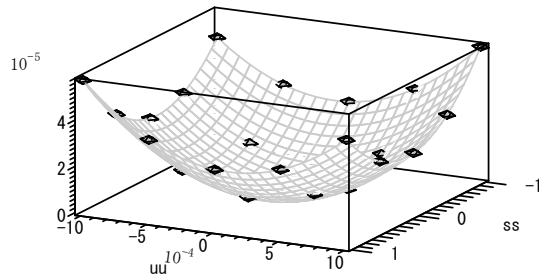


xy平面への応用

実際のデータ解析での例。データの座標をx,y,zで用意して、Mapleの埋め込み関数のleastsquareでfitしている。

```
> z:=[0.000046079702088, 0.000029479057275,
0.000025769637830, 0.000034951410953, 0.000057024385455,
0.000029485453808, 0.000011519913869, 0.000011519913869,
0.000006442404299, 0.000014252898382, 0.000034951410953,
0.000025769637773, 0.000006442404242, 0.000006442404242,
0.000000000000057, 0.000006442404242, 0.000025769637773,
0.000034932221524, 0.000014246501905,
0.000006442404299, 0.000011519913926, 0.000029479057332,
0.000056973214100, 0.000034932221467,
0.000025769637773, 0.000029485453808, 0.000046079702031]:
> x:=[]:
> y:=[]:
> p1:=2:
> for i from -p1 to p1 do
  for j from -p1 to p1 do
    x:=[op(x),i*0.0005];
    y:=[op(y),j*0.0005];
  end do;
end do;
> with(LinearAlgebra):
> p2:=convert(Transpose(Matrix([x,y,z])),listlist):
> pp2:=pointplot3d(p2,symbol=circle,symbolsize=30,color=black):
> with(stats):
> data:=[x,y,z]:
> fit1:=fit[leastsquare]([t,s,u], u=a+b*t+c*s+d*t*s+e*t^2+f*
s^2, {a,b,c,d,e,f})(data);
Warning, these names have been redefined: anova, describe,
fit, importdata, random, statevalf, statplots, transform
fit1 := u = -8.657142857 10-13 + 25.76962838 t2 - 5.459553587 t s
+ 25.76962835 s2 - 0.000006396456800 t + 0.000006396438400 s
> f1:=unapply(rhs(fit1),(s,t)):
> pf1:=plot3d(f1(ss,uu),ss=-0.001..0.001,uu=-0.001..0.001,color=
gray):
> display(pf1,pp2);
```



正規方程式による解法

デザイン行列へのデータ変換

```
> bb:=Vector(25):
> A:=Matrix(25,6):
> p1:=2:
> for i from 1 to 25 do
  A[i,1]:=1;
  A[i,2]:=x[i];
  A[i,3]:=y[i];
  A[i,4]:=x[i]*y[i];
  A[i,5]:=x[i]^2;
  A[i,6]:=y[i]^2;
  bb[i]:=z[i];
end do;
正規方程式の解
> MatrixInverse(Transpose(A).A).(Transpose(A).bb);
```

-9.18525727877410243 10 ⁻¹³
-0.00000639644675999573400
0.00000639644220000031684
-5.45955358335999907
25.7696284050857330
25.7696284050857330