**t<-read.table(choose.files() )**

**y<-cbind(t$V3,t$V4,t$V3)**

**aggregate(y,by=list(t$V1,t$V2),FUN=mean)**

Group.1 Group.2 V1 V2 V3

1 0 0 6.30 9.56 6.30

2 1 0 6.88 8.72 6.88

3 0 1 6.68 9.58 6.68

4 1 1 7.28 9.40 7.28

aggregate(y,by=list(t$V1,t$V2),FUN=sd)

Group.1 Group.2 V1 V2 V3

1 0 0 0.3082207 0.2509980 0.3082207

2 1 0 0.2588436 0.4494441 0.2588436

3 0 1 0.4604346 0.3701351 0.4604346

4 1 1 0.2588436 0.5049752 0.2588436

fit<-manova(y~t$V1+t$V2+t$V1:t$V2)

> summary.aov(fit)

Response 1 :

Df Sum Sq Mean Sq F value Pr(>F)

t$V1 1 1.7405 1.74050 15.7868 0.001092 \*\*

t$V2 1 0.7605 0.76050 6.8980 0.018330 \*

t$V1:t$V2 1 0.0005 0.00050 0.0045 0.947143

Residuals 16 1.7640 0.11025

---

Signif. codes:

0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Response 2 :

Df Sum Sq Mean Sq F value Pr(>F)

t$V1 1 1.3005 1.30050 7.9178 0.01248 \*

t$V2 1 0.6125 0.61250 3.7291 0.07139 .

t$V1:t$V2 1 0.5445 0.54450 3.3151 0.08740 .

Residuals 16 2.6280 0.16425

---

Signif. codes:

0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Response 3 :

Df Sum Sq Mean Sq F value Pr(>F)

t$V1 1 1.7405 1.74050 15.7868 0.001092 \*\*

t$V2 1 0.7605 0.76050 6.8980 0.018330 \*

t$V1:t$V2 1 0.0005 0.00050 0.0045 0.947143

Residuals 16 1.7640 0.11025

---

Signif. codes:

0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

**结论：若多元正态性假设成立。**

**1拉速对三个指标都有显著影响。**

**2添加对指标一和指标三有一定影响**

**3拉速和添加剂的协调效果对三个指标都几乎没有影响。**

shapiro.test(y[1:5,])

Shapiro-Wilk normality test

data: y[1:5, ]

W = 0.74244, p-value = 0.0007347

shapiro.test(y[6:10,])

Shapiro-Wilk normality test

data: y[6:10, ]

W = 0.81995, p-value = 0.006707

>

> shapiro.test(y[16:20,])

Shapiro-Wilk normality test

data: y[16:20, ]

W = 0.81165, p-value = 0.005207

> shapiro.test(y[11:15,])

Shapiro-Wilk normality test

data: y[11:15, ]

W = 0.82512, p-value = 0.007868

**数据满足正态性假设**