On the ASR62 magnet (34^0)

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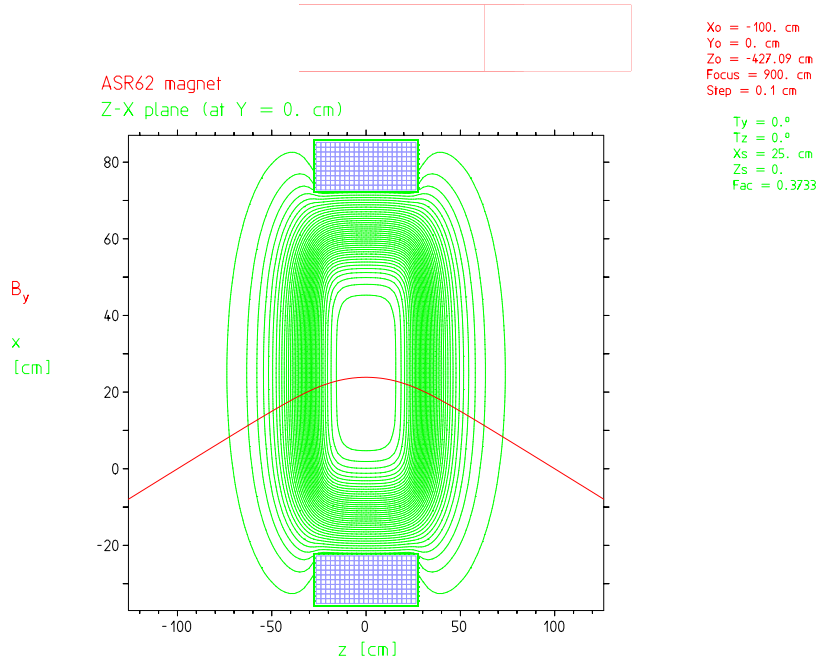

1 ASR62 magnet

1.1 Results from TRAJG programme

Here is the **asr24g.set** file

```
MAPINPUT
asr24g100

ADJUST
 1       0.373333      25.0000       0.0000       0.0000       0.0000       0.0000

KINE
   28.000  -100.000     0.000   -427.090    17.000     0.100     0.000   105.658

STANDARD
  1  0.1000E-02  0.1000E-01   10000       80.00       40.00

FOCUS
      900.0000

WINDOW
 -500.0000     500.0000   -150.0000     150.0000    -60.0000      60.0000
 -500.0000     500.0000   -150.0000     400.0000    -60.0000      60.0000
 -150.0000     800.0000   -150.0000     800.0000    -60.0000      60.0000

MATRICE
    0.5000      10.0000       0.5000      10.0000       1.0000  1

INTERPOL
Yes

CAPTION
      ASR62 magnet

MARGE
YES

OLD
YES

ZONE
```

and the corresponding first order matrix elements :

```
ASR62 magnet
*************

Po =    28.0000 MeV/c    dP =     0.0000 MeV/c

n      Fac       Xs [cm]     Ys [cm]     Zs [cm]     Ty []       Tz []
1        0.3733     25.0000      0.0000      0.0000      0.0000      0.0000

Deviation angle is =    33.9930

xm             ym             xpm            ypm           dpm [MeV/c]
0.5000         0.5000         10.0000        10.0000         1.0000

Xo =  -100.00 cm  Yo =     0.00 cm  Zo =  -427.09

Xa =    25.0000 cm  Ya =     0.0000 cm   Za =     0.0000 cm

Foc =   900.0000 cm    Step =     0.10 cm  Eps = 0.1000E-02

Detx = 0.1005E+01    Dety = 0.9971E+00

Determinant = 0.1002E+01

QUADRATIC Interpolation

                  *TRANSFORM* 1

 0.77403   0.79665   0.00000   0.00000   0.00000   2.72572
-0.50974   0.77340   0.00000   0.00000   0.00000   6.03142
 0.00000   0.00000  -0.39976   0.27713   0.00000   0.00000
 0.00000   0.00000  -3.05994  -0.37296   0.00000   0.00000
 0.00000   0.00000   0.00000   0.00000   0.00000   1.00000
```

Here are the levels and the effective length

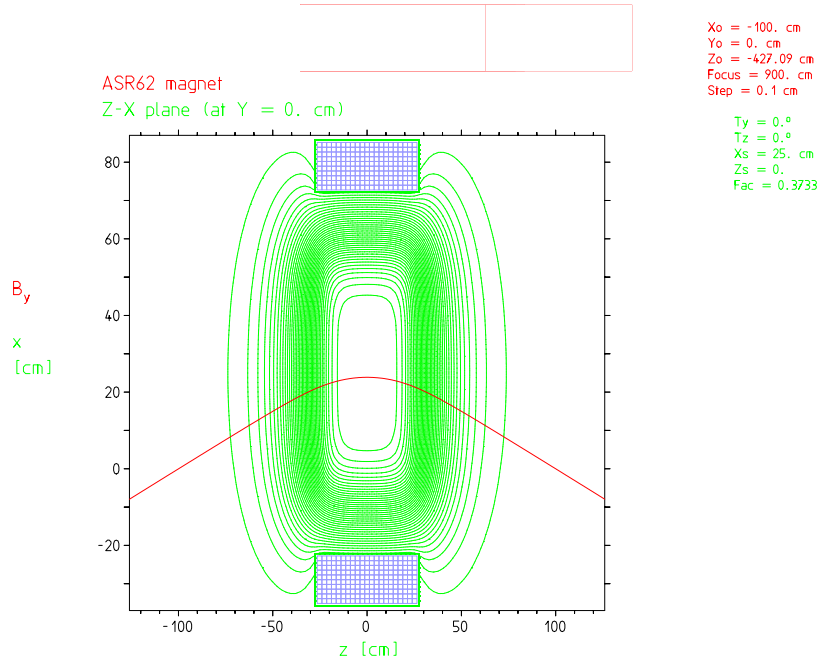

Figure 1:

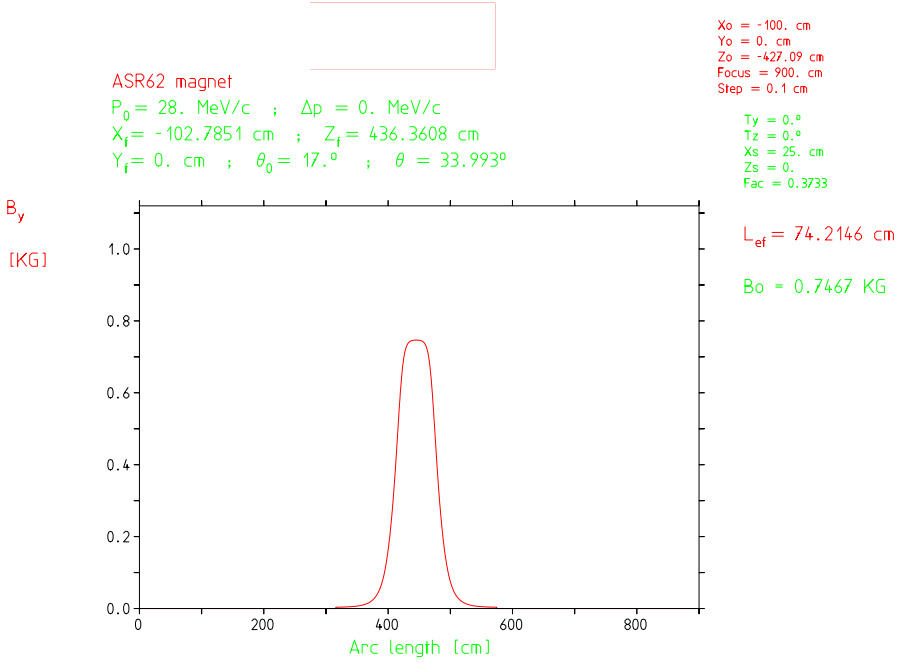

Figure 2:

Here an example of rays through the magnet :

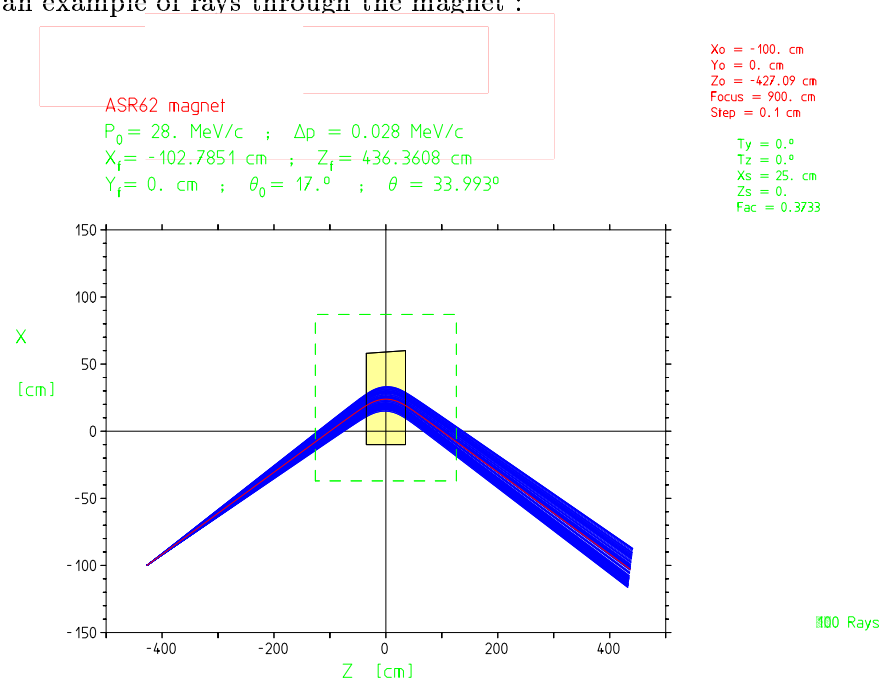

Figure 3:

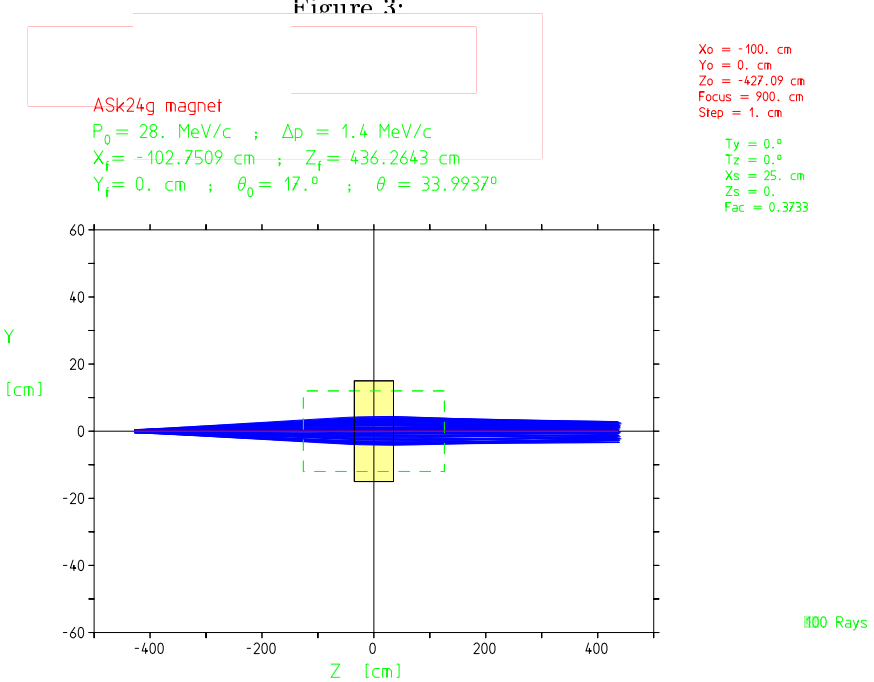

Figure 4:

In summary

L_{eff}	74.2 cm
Gap	24 cm
B_0	0.7467 KG
θ	34^0

1.2 Results from FIELD_BIS programme

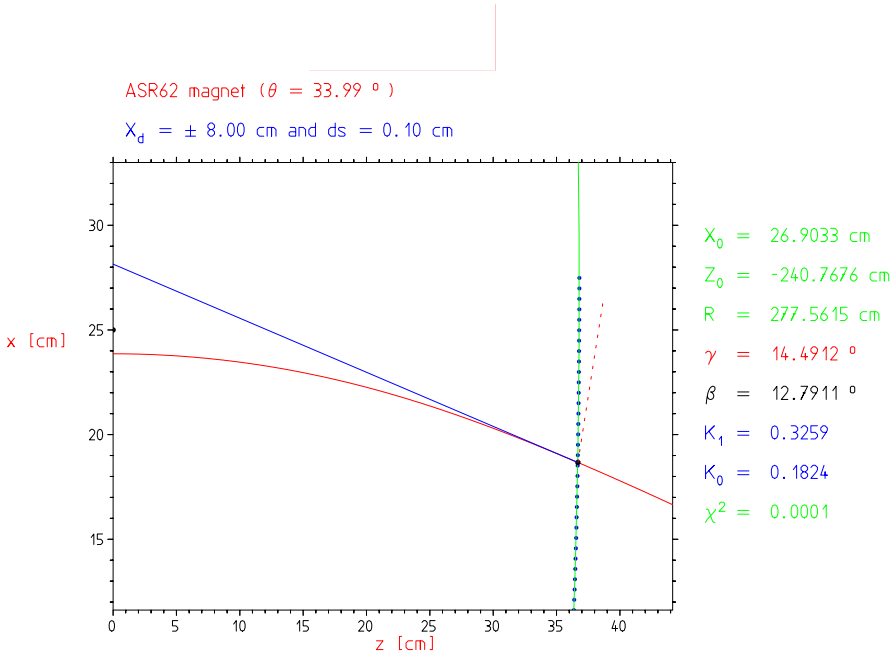

Figure 5:

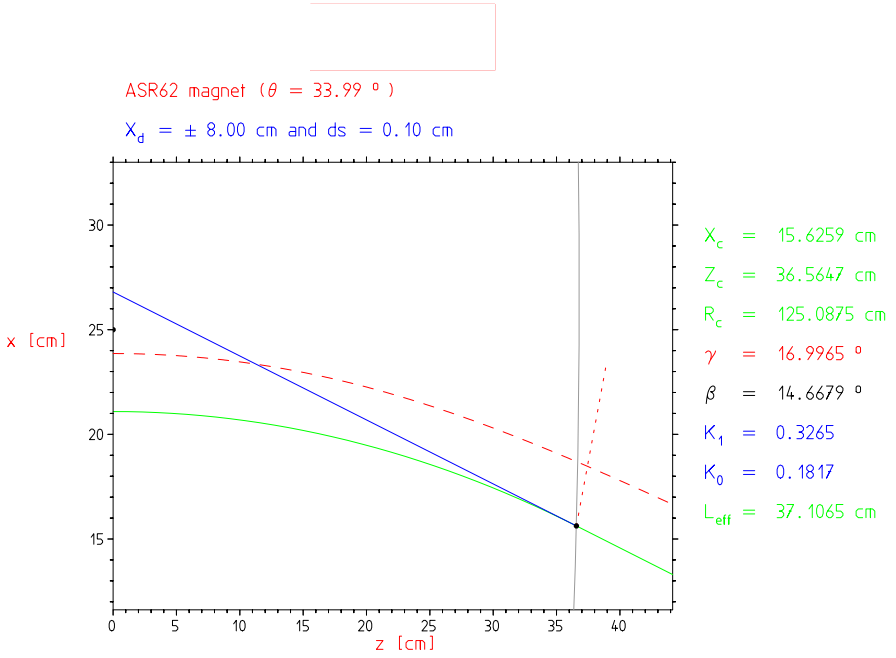

Figure 6:

In the above picture

- γ is the bending angle of the half magnet
- β is the pole face rotation
- K_1 is the K integral for the whole half magnet
- K_0 is the K integral for fringing part of the half magnet
- R is the curvature radius of ideal field boundary
- R_c is the curvature radius of ideal trajectory

Both figures are with the ideal field boundary (points or grey curve).
The first figure is with true central trajectory (in red), and the second one is with **ideal** trajectory (portion of circle in green).

From this we conclude that

$$\beta \simeq 15^0$$

$$R \simeq 2.7\,\mathrm{m}$$

$$K_1 = 3.2$$

1.3 Results from TRANS programme

Here is the used file (trans.asr62) :

```
ASR62 magnet ( 34 #22;L2#1#1;L1#)
40.  40.  7.
.5 20. .5 20 5.  28.
D 4.129
P  15. 0.32  2.8  0.37 IN
M  34. 0.742  0.12  0.0 ASR62
P  15. 0.32  2.8  0.37 OUT
D 4.129
ZONE
```

The corresponding first order matrix elements are :

```
ASR62 magnet ( 34 #22;L2#1#1;L1#)

0.5000       20.0000        0.5000       20.0000        5.0000       28.0000

Focus = 9.0000 m


               First order matrix

+0.7320     +0.7763     +0.0000     +0.0000     +2.7118
-0.5979     +0.7320     +0.0000     +0.0000     +6.0500
+0.0000     +0.0000     -0.3591     +0.2899     +0.0000
+0.0000     +0.0000     -3.0045     -0.3591     +0.0000
+0.0000     +0.0000     +0.0000     +0.0000     +1.0000

Detx  = +1.0000 ; Dety = +1.0000

                Det  = 1.0000
```

Here are the coresponding envelope (see figures 3-4)

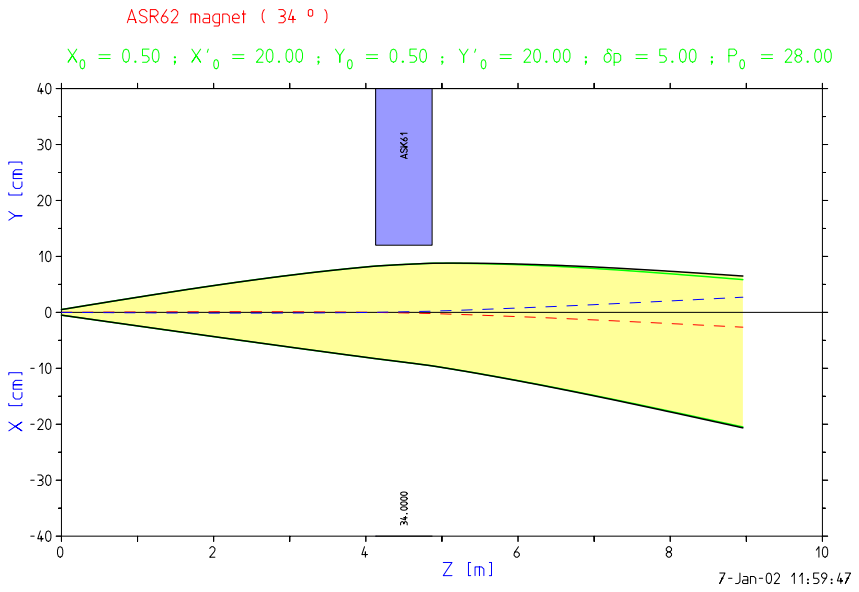

Figure 7:

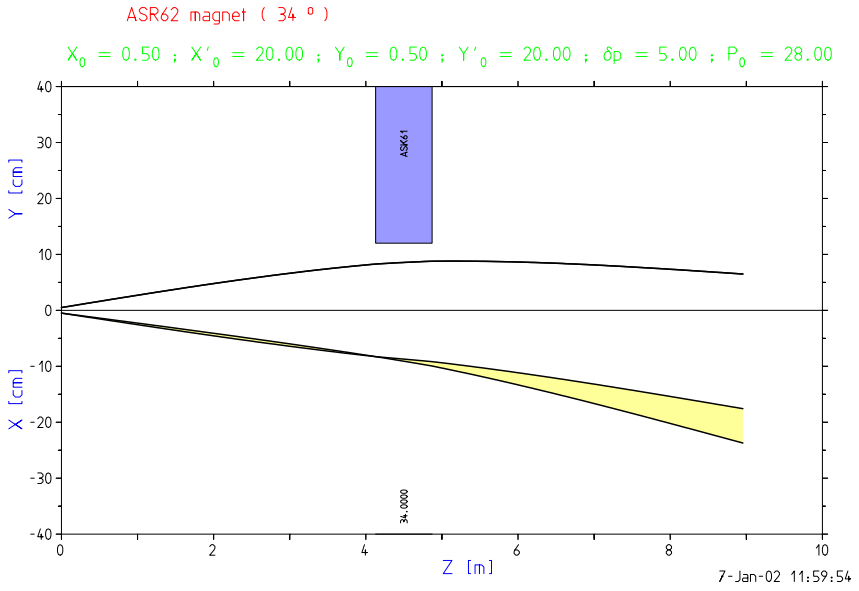

Figure 8:

1.4 Rotated ASR62 magnet

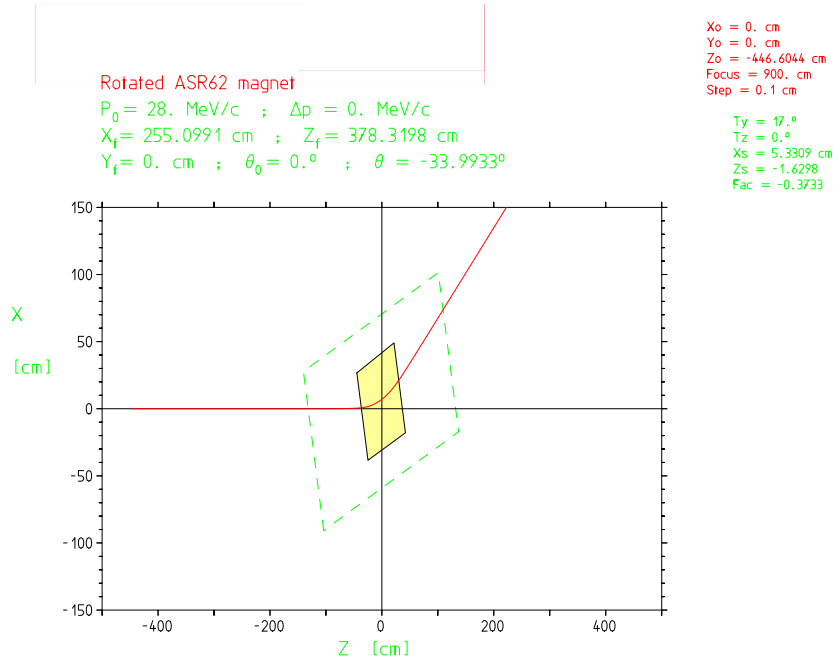

Figure 9:

According to my report : On positioning of dipoles, updated version PSI 2000, we have for the rotated ASR62 magnet :

$$\begin{aligned}
\Gamma &= -427.090\,\mathrm{tg}(17) + 100 + 25 = -5.5745 \\
X_g &= +5.5745\cos(17) = +5.3309 \\
Z_d &= -5.5745\sin(17) = -1.6298 \\
Z'_d &= \frac{-427.090}{\cos(17)} = -446.6044
\end{aligned}$$

For a horizontal incoming beam the corresponding *.set file is (asr24gr.set) :

```
MAPINPUT
asr24g100

ADJUST
 1      -.373333      5.33090       0.0000      -1.62980      17.0000      0.0000

KINE
   28.000    0.000    0.000   -446.6044    0.000     0.100    0.000    105.658

STANDARD
  1  0.1000E-02  0.1000E-01   10000       80.00       40.00

FOCUS
      900.0000

WINDOW
 -500.0000    500.0000   -150.0000    150.0000    -60.0000     60.0000
 -500.0000    500.0000   -150.0000    400.0000    -60.0000     60.0000
 -150.0000    800.0000   -150.0000    800.0000    -60.0000     60.0000

MATRICE
    0.5000     10.0000      0.5000     10.0000      1.0000  1

INTERPOL
Yes

CAPTION
      Rotated ASR62 magnet

MARGE
YES

OLD
YES

ZONE
```

and here is the corresponding first order matrix :

```
Rotated ASR62 magnet
********************

Po =    28.0000 MeV/c    dP =     0.0000 MeV/c

n     Fac       Xs [cm]     Ys [cm]     Zs [cm]     Ty []       Tz []
1       -0.3733      5.3309      0.0000     -1.6298     17.0000      0.0000

Deviation angle is =   -33.9933

xm             ym             xpm            ypm           dpm [MeV/c]
0.5000         0.5000         10.0000        10.0000         1.0000

Xo =     0.00 cm  Yo =     0.00 cm  Zo =  -446.60

Xa =     5.3309 cm  Ya =     0.0000 cm   Za =    -1.6298 cm

Foc =   900.0000 cm    Step =     0.10 cm  Eps = 0.1000E-02

Detx = 0.1013E+01    Dety = 0.9972E+00

            Determinant = 0.1011E+01

QUADRATIC Interpolation

                    *TRANSFORM* 1

 0.78541   0.79584   0.00000   0.00000   0.00000  -2.72292
-0.50977   0.77380   0.00000   0.00000   0.00000  -6.03057
 0.00000   0.00000  -0.39998   0.27709   0.00000   0.00000
 0.00000   0.00000  -3.06038  -0.37316   0.00000   0.00000
 0.00000   0.00000   0.00000   0.00000   0.00000   1.00000
```

Contents