Fermilab

$\bar{p}$ Note #380A

End Field of Large-Aperture Quadrupoles

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This is a continuation of $\bar{p}$ Note #380 which describes the end field of small-aperture quadrupole SQC#147. The large-aperture quadrupole measured for this note is LQC#001. See $\bar{p}$ Note #380 for the explanation.

$$(\partial B_Y/\partial X) \quad \propto \quad f_2(Z) - (1/4)f_2''(Z)\cdot X^2 \tag{1}$$

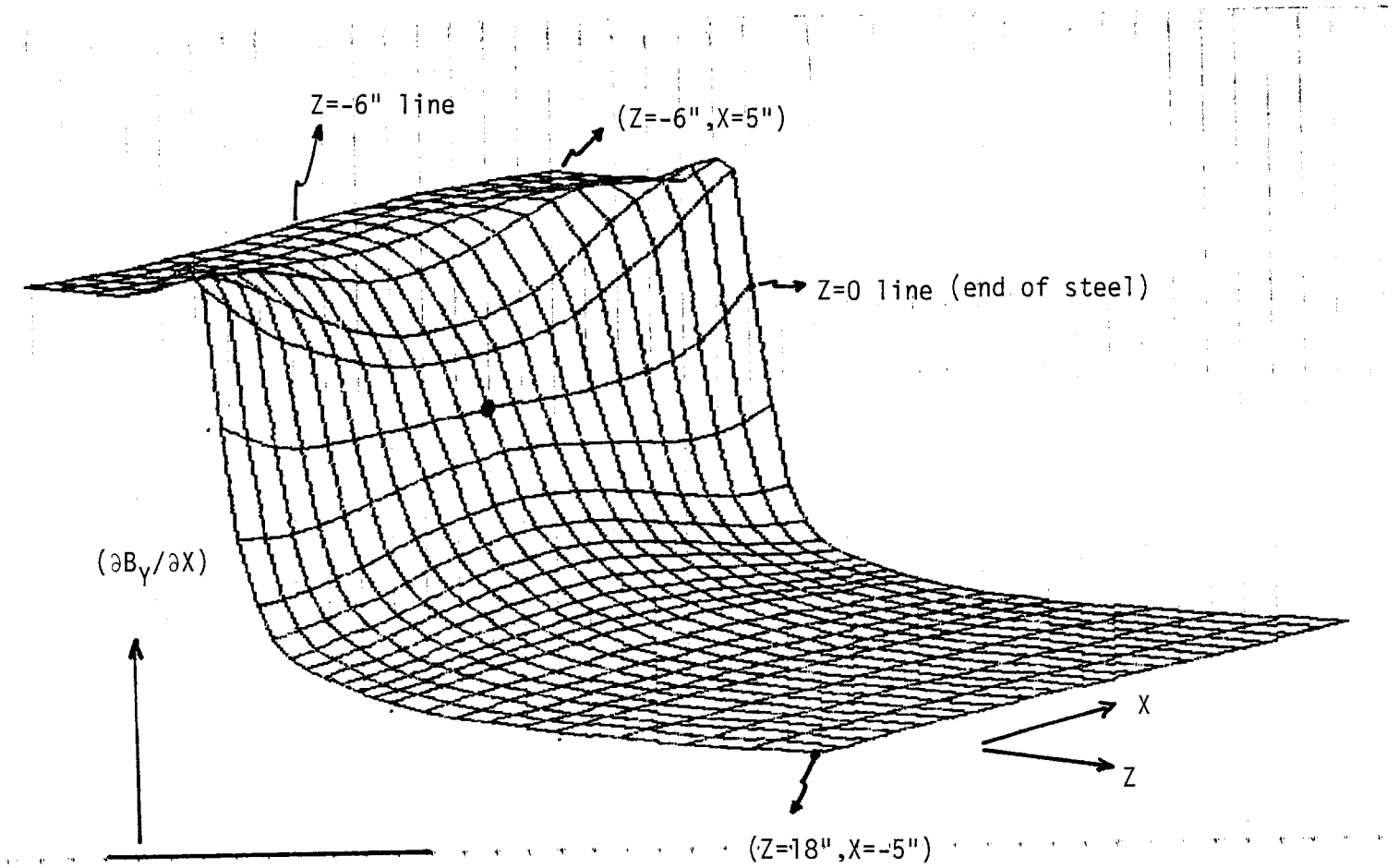
$$f_2(Z) = \frac{1}{1 + \alpha(Z + 6'')^p} \; ; \; \alpha = 1.955\text{x}10^{-4} \quad p = 4.55 \tag{2}$$

The fit is not perfect (see Figs. 2 and 3) but it is totally adequate for the purpose explained in $\bar{p}$ Note #313.

Again Bob Peters have done all the measurements.

Fig. 1 Large-aperture quadrupole LQC

(measured by R. Peters)



X = -5"(0.5")5"

Z = -5",-4",-3",-2",-1",-0.5",0,+0.5",1",1.5",2",2.5",3",3.5",4",4.5",
5",6",7",8",9",10",12",14",16",18"

K+E 10 X 10 TO THE CENTIMETER 18 X 25 CM.
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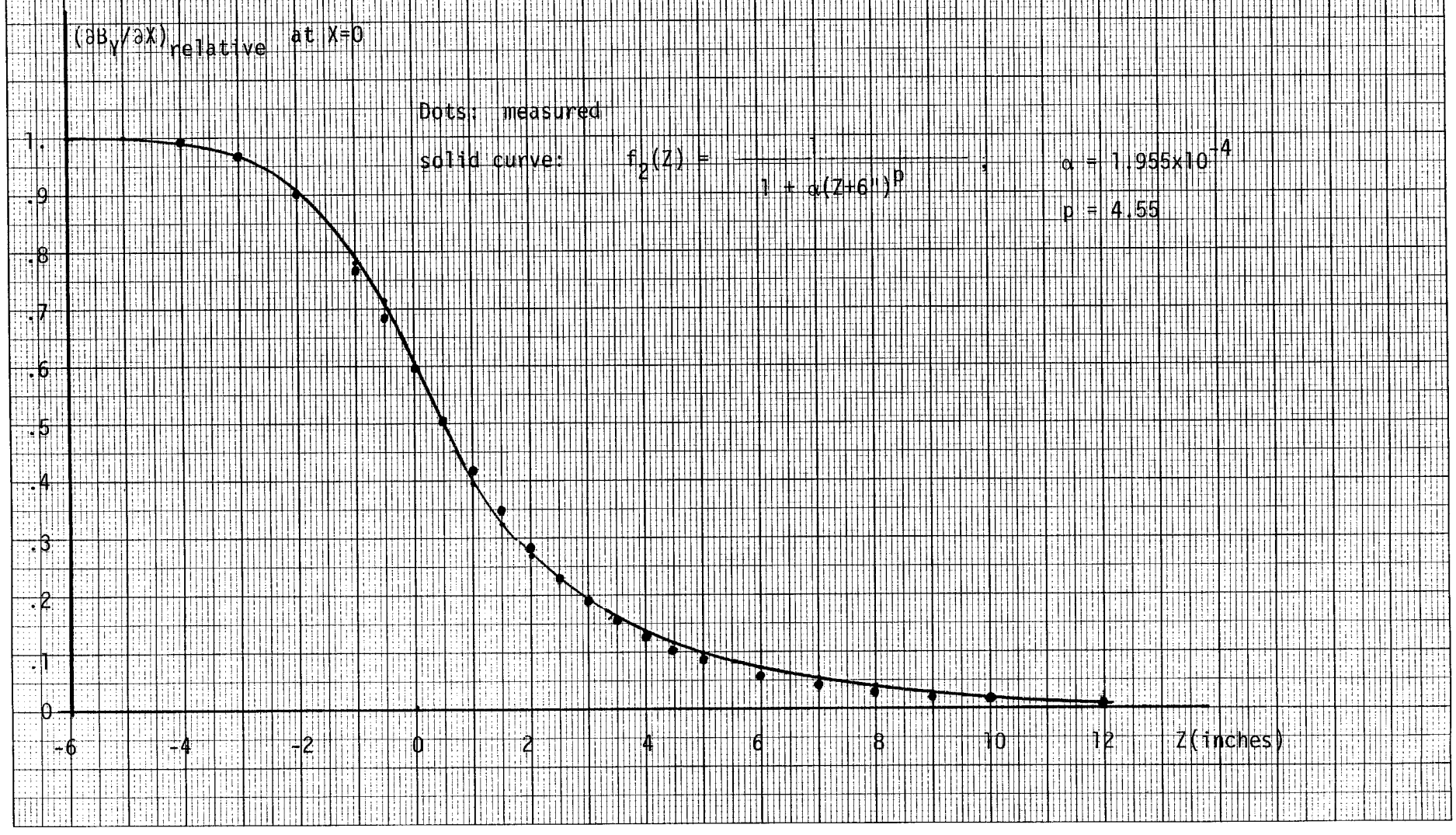
Fig. 2 Large-aperture quadrupole LQC: end field as measured by R. Peters



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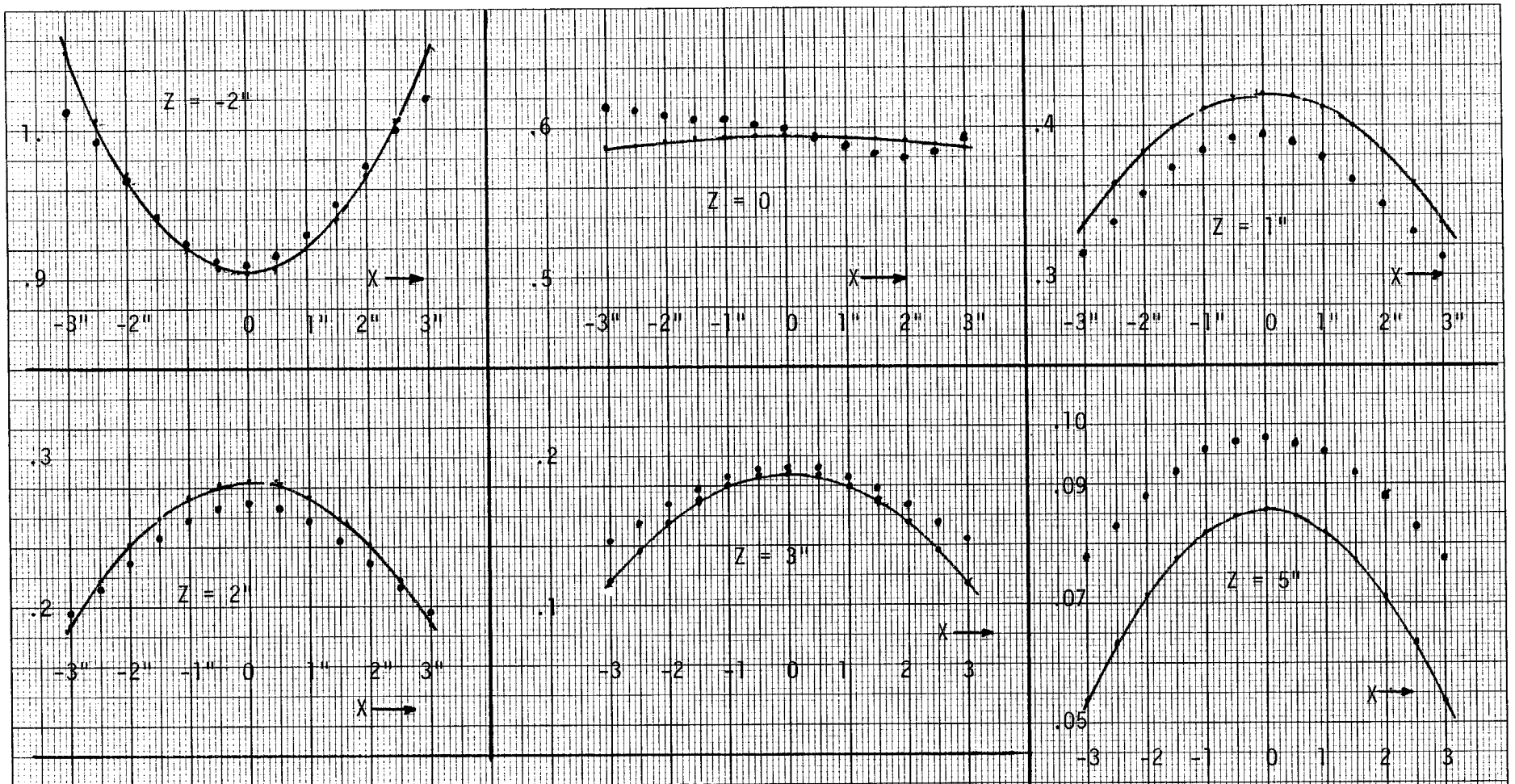

$(\partial B_y/\partial X)$ relative to its value at Z=-6"

Dots are the measured values and the solid curves are from Eqs. (1) and (2).

Note the change in scale.

Fig. 3