

Relationship Between Coil-Size and Preloading in 50 mm Magnets

Masayoshi Wake
Fermilab,TS/Mag.R&D
April 15, 1991

The relationship between coil size and the pre-stress can not be expressed by a simple function. So far, the simple spring model had little success in the experience of 40 mm magnets. Since we are now accumulating the experience and data in the 50 mm magnets, a good way of displaying the data may be helpful to find the relationship.

I made a correlation plot like in Fig1. and found this way of display may be useful for us. The x-coordinate is the oversize of the inner coil and y-coordinate is the oversize of the outer coil. Therefore the position of rectangular mark represent the size information of the coils. These data are taken at the position of the pressure gage instead of the averaged dimension. Data are marked with and without including additional shims for the assembly of the collar. The arrow represent the over pressure vector. Right direction means (pressure - 8 ksi) and up direction means (overpressure - 10 ksi) in the inner coil. The negative numbers, under pressure, are represented by the arrow of opposite directions. The length of the vector in the scale of mil agrees with the pressure in ksi.

By the accumulation of the data on this plot, we should be able to find where to settle the coil size for the proper preloading even if there are large noise and the relationship is very much complicated. Figure 2 is what this picture should look like when the simple spring model is valid. Figure3 and 4 are the case for having 40 cross term in positive and negative between inner coil and outer coil, i.e. for the case there is a friction between inner and outer coil.

Distribution:

R. Bossert
S. Delchamps
M. Gordon
S. Gourlay
T. Jaffery
M. Kuchnir
P. Mantsch
G. Pewitt
D. Sims
J. Strait

FIG. 7.

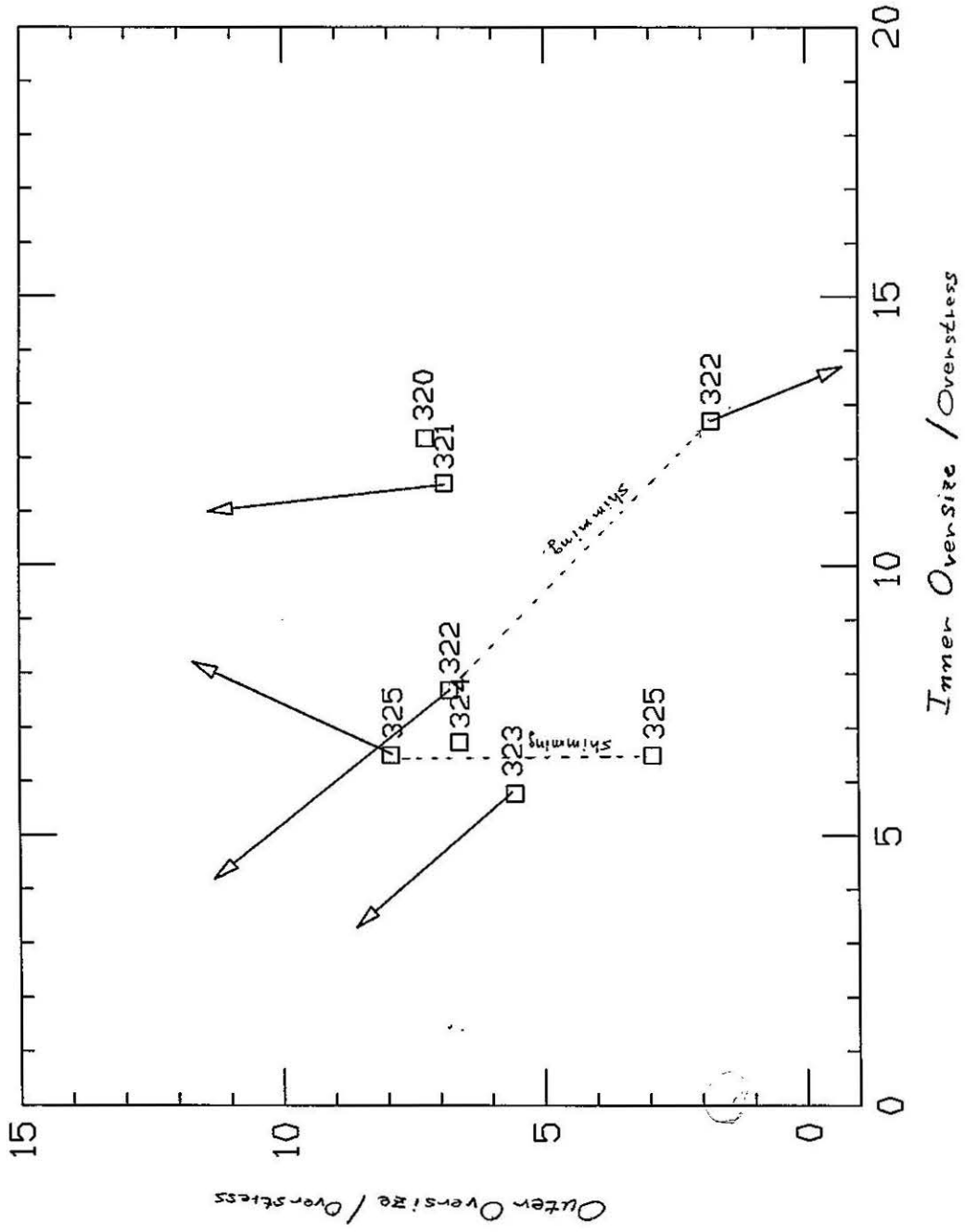


FIG. 2

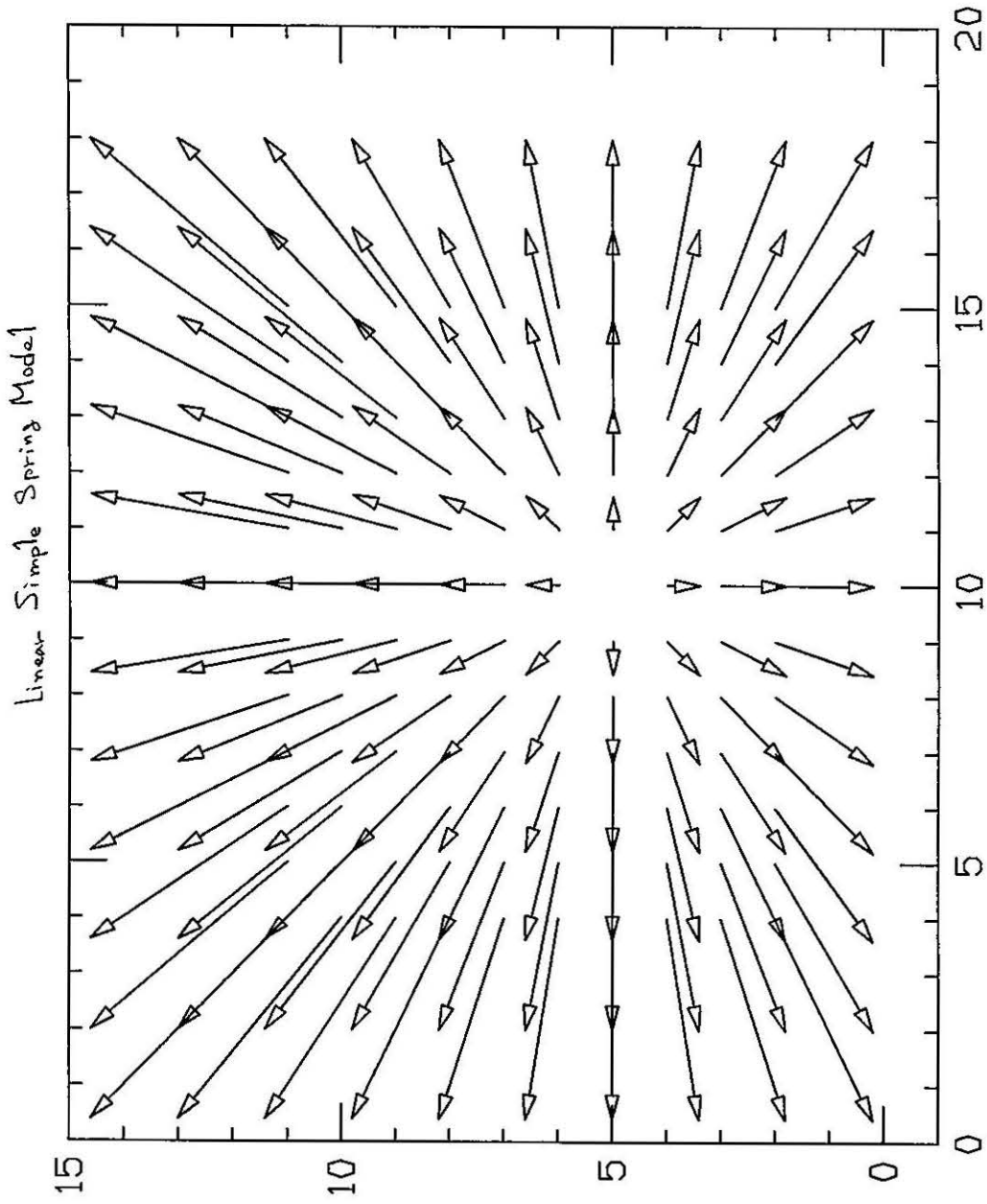


FIG 3

40% Cross term

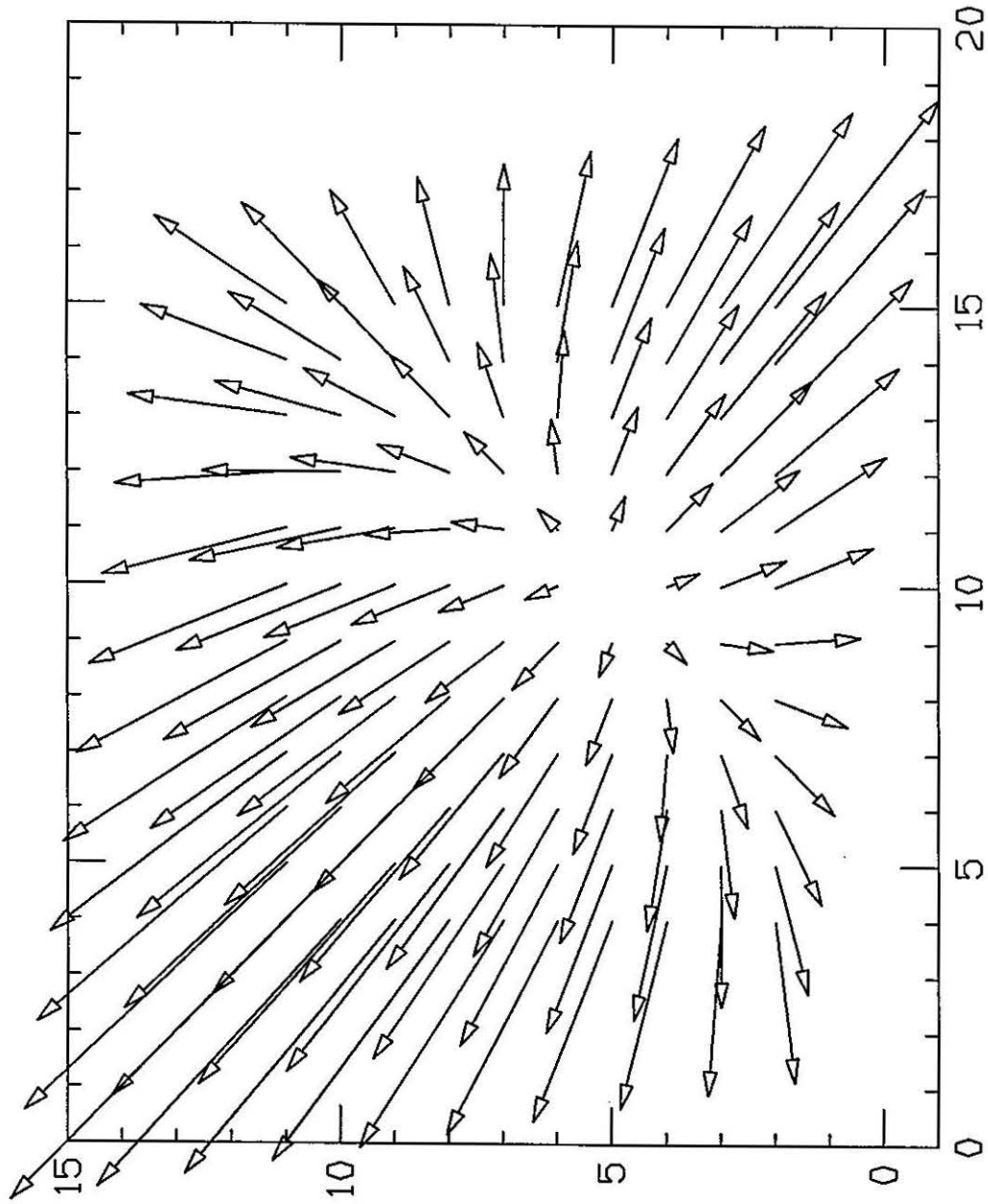


FIG. 4

