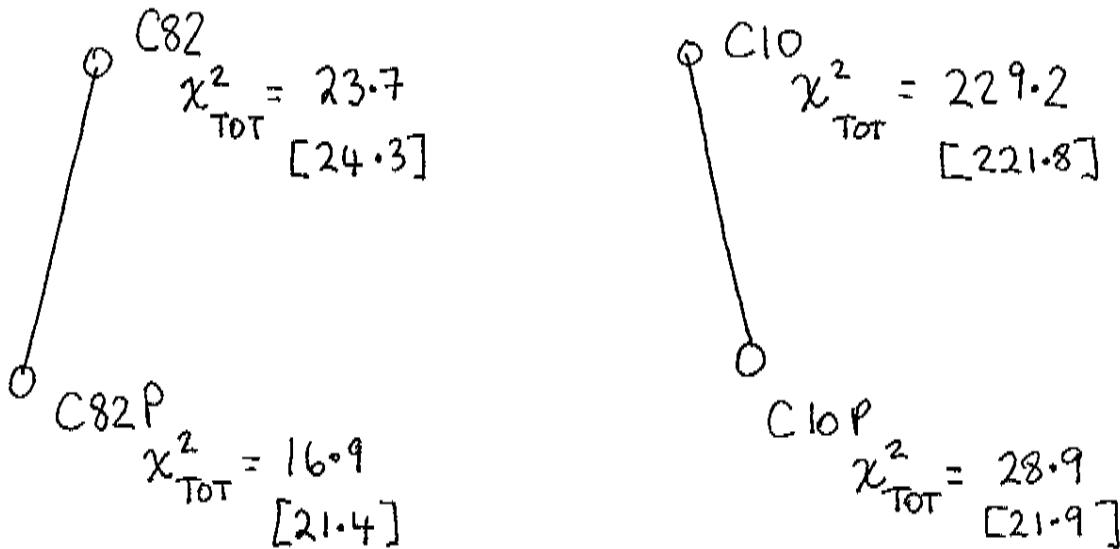


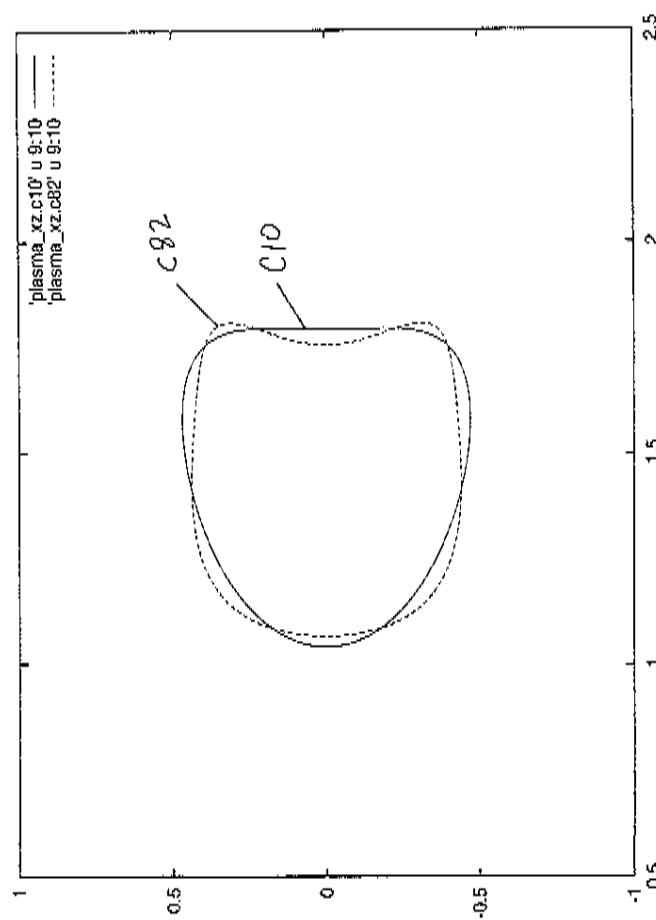
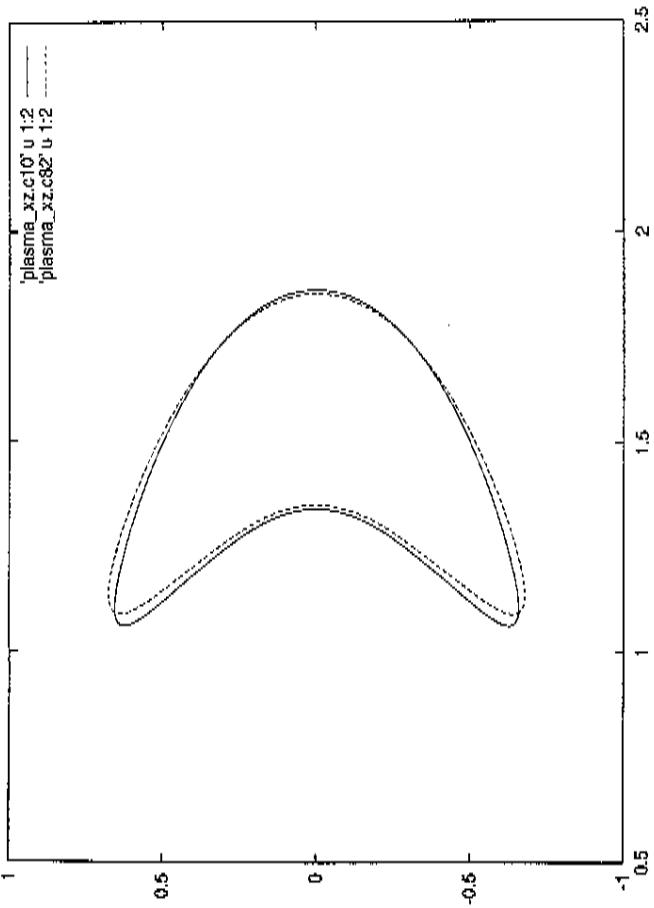
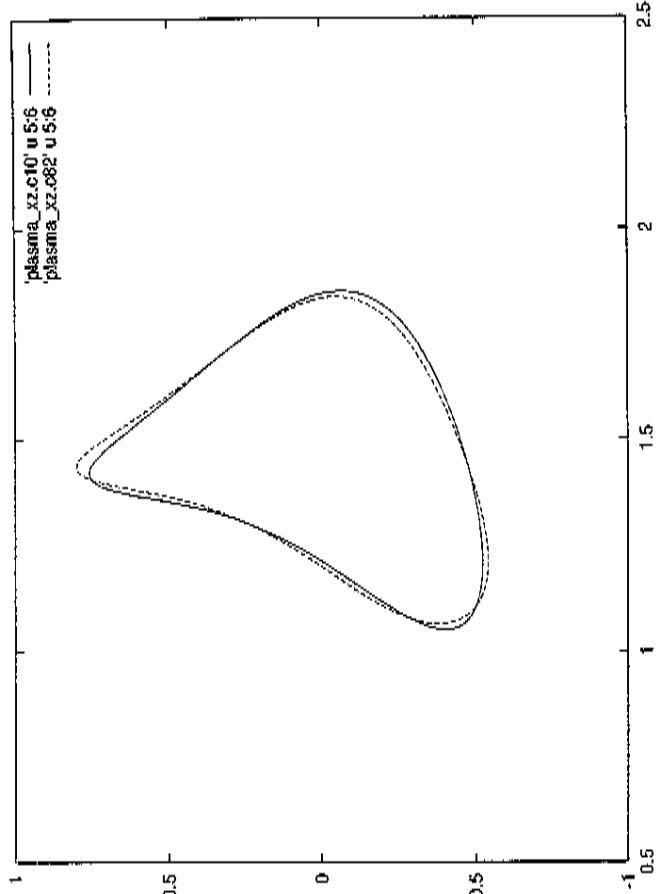
Neil Pomphrey
3/16/00
NCSX Mtg.

Optimizer Behavior for c10-c10p, c82-c82p Experiment
(addendum to Harry Mynick's 3/16/00 presentation)
- contributions from Ron Hatcher -



- For optimizer run starting with c10, why does optimizer stop at c10p instead of taking us to c82p?
- Harry showed a small ridge between c10p and c82p.
- Can we jostle the optimizer trajectory on c10 path to get over/around the ridge and down the cliff to c82p?

First, **c10, c10p, c82 and c82p** plasma shapes.



COMPARISON OF
C10 WITH C82
(INITIAL STATES)

Fig 1

②

$C_{10} \rightarrow C_{10P}$ (overlays)

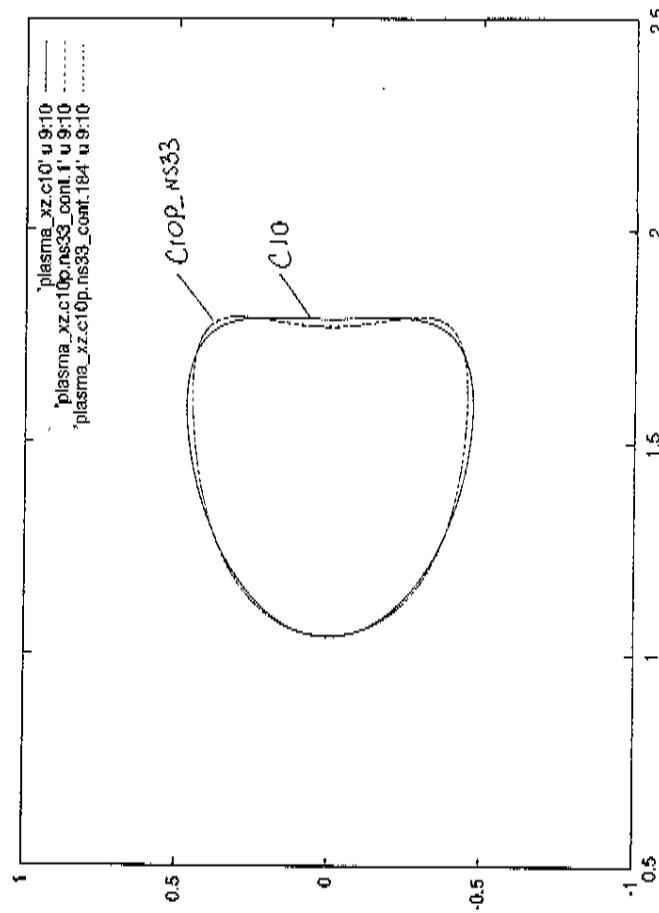
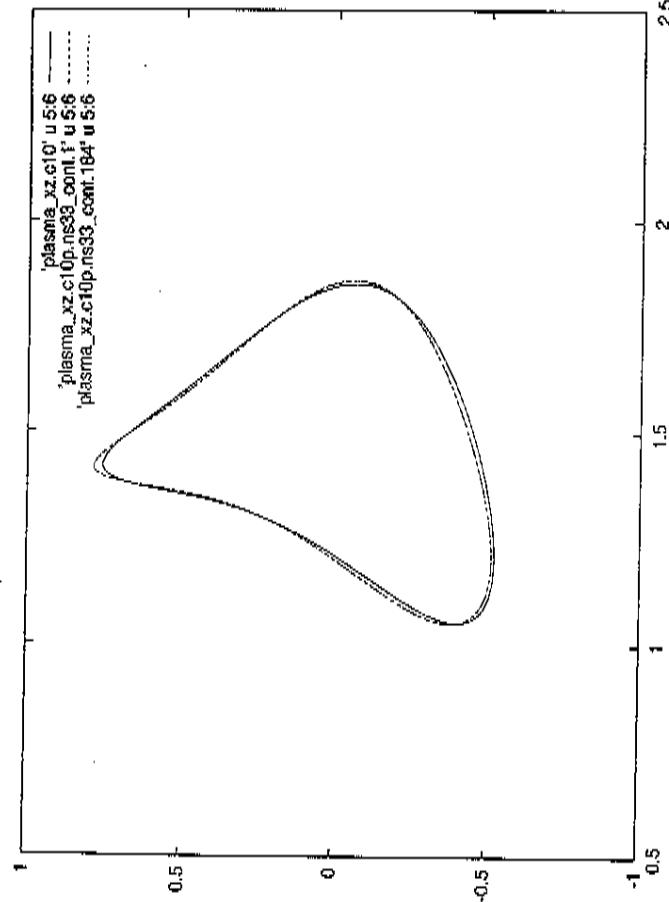
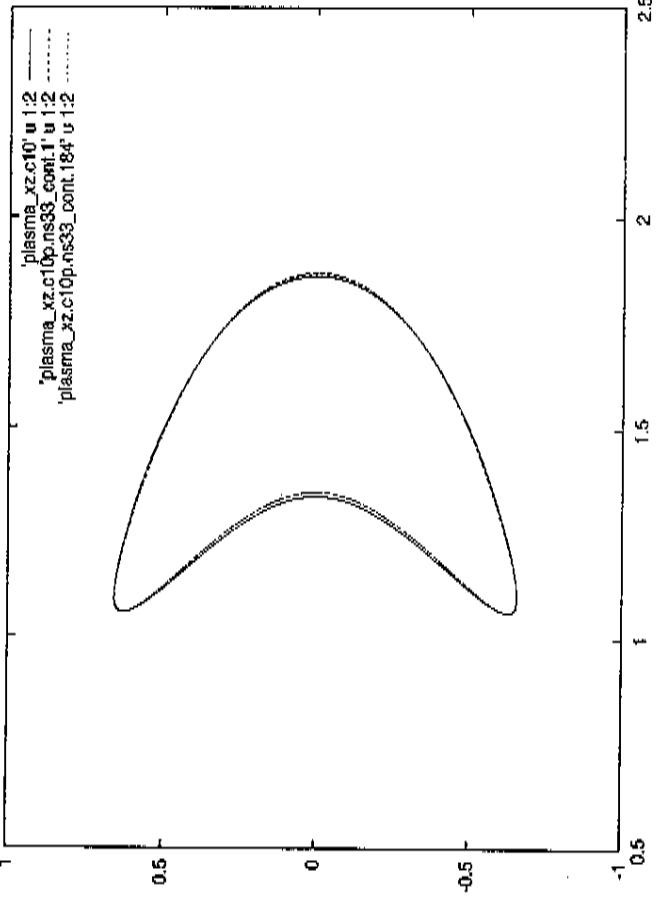


Fig 2

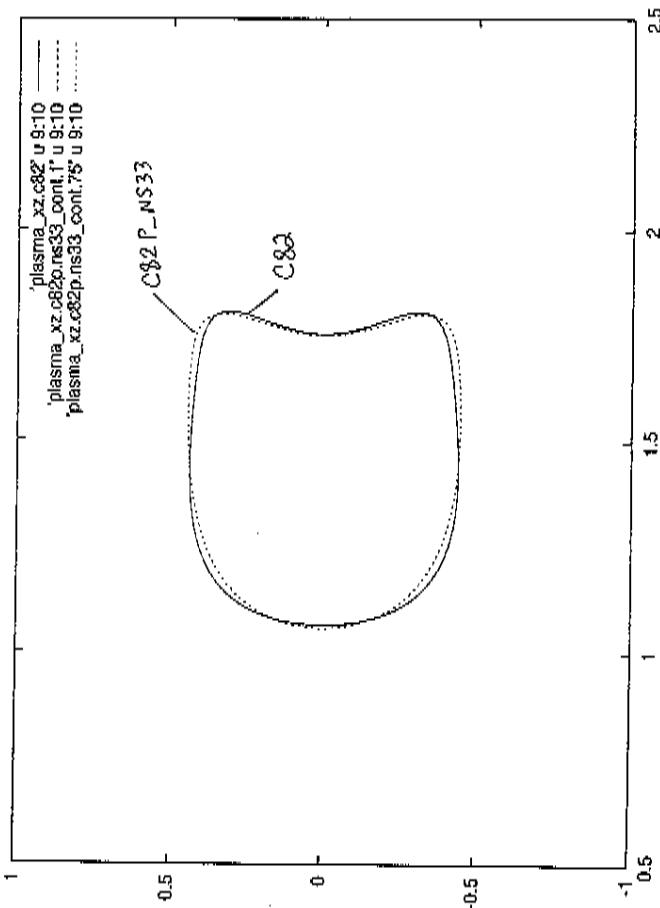
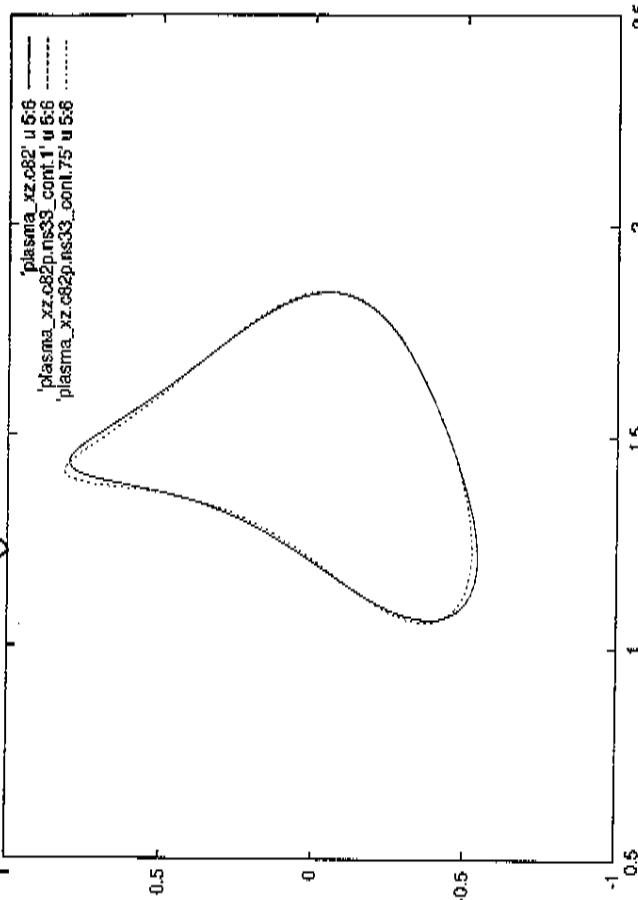
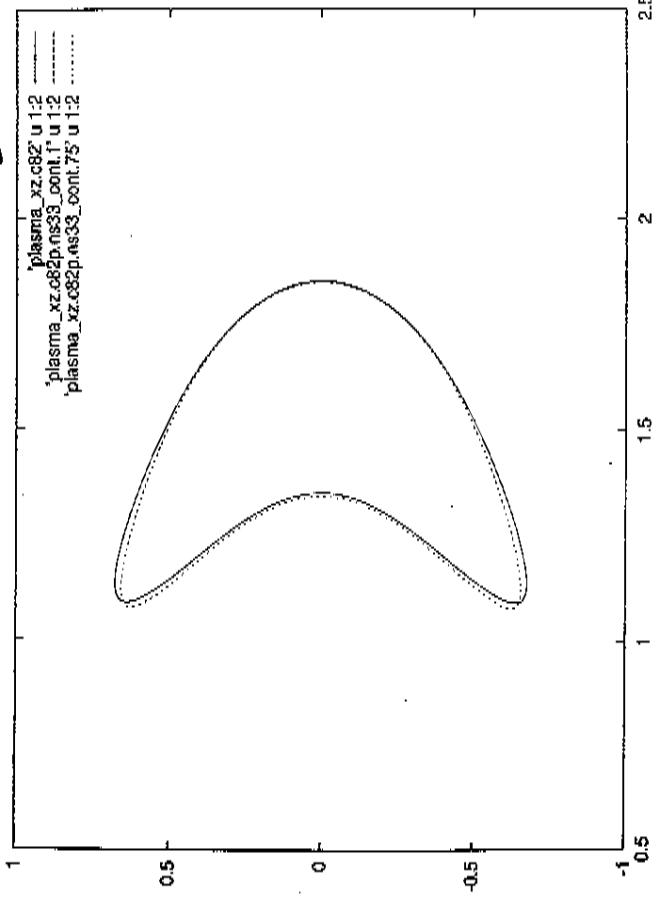
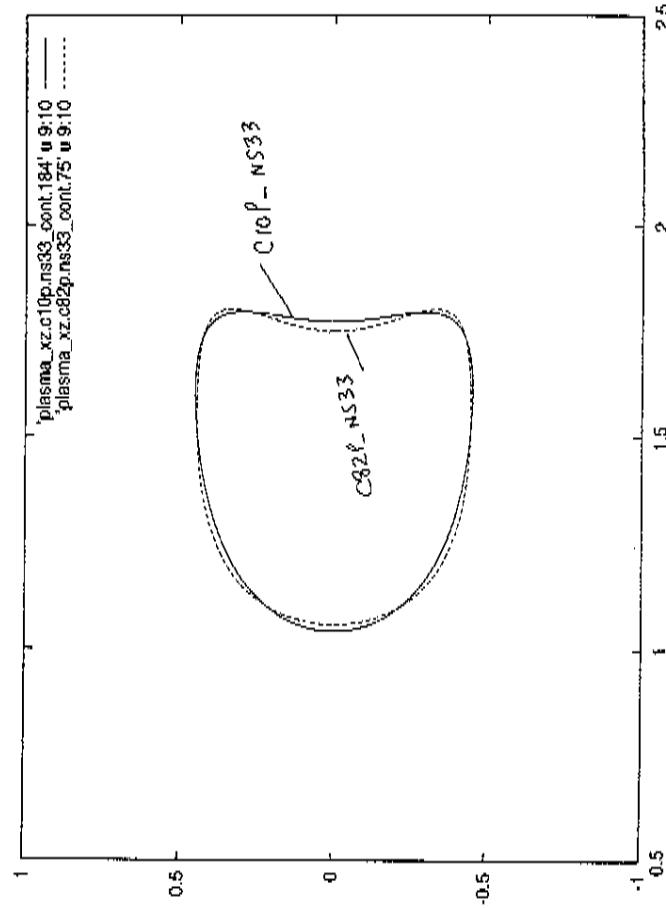
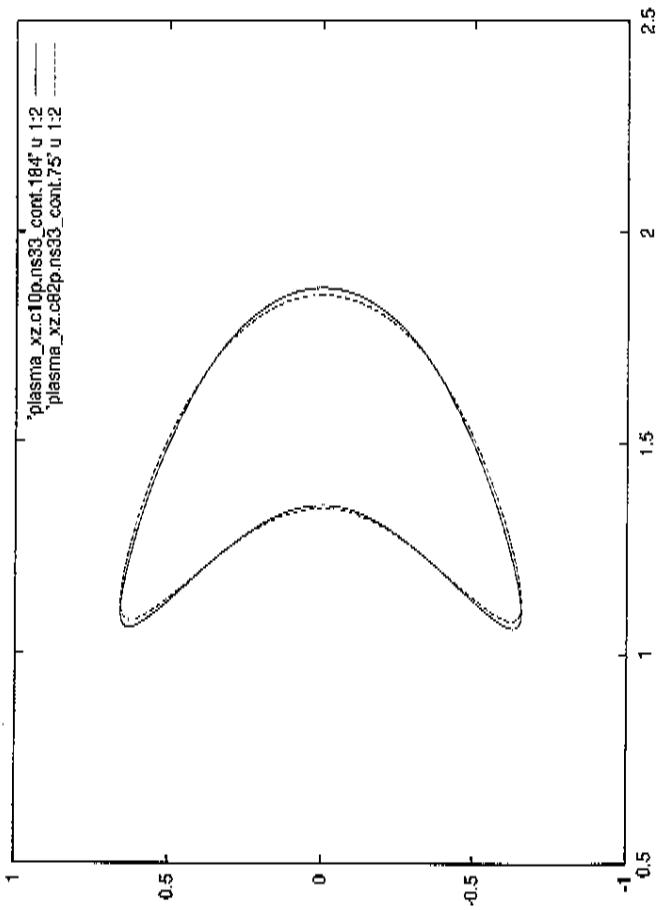
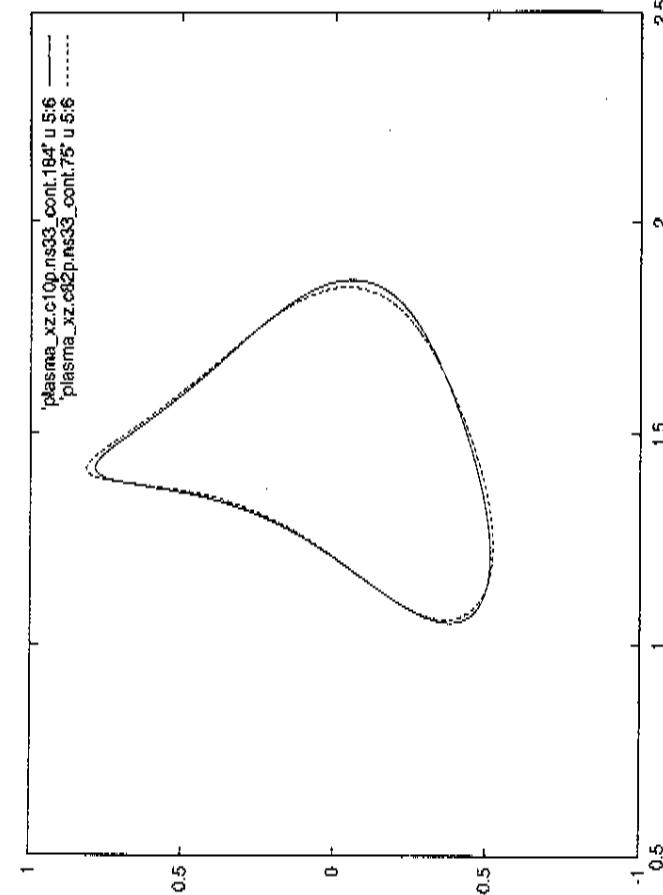
$C82 \rightarrow C82P$ (overlays)

Fig 3



COMPARISON OF
C10P WITH C82P
(Final states)

So far, we have attempted one simple method of jostling:

- Starting with c10p, enhance the step length ΔZ_j (code variable EPSFCN) used for evaluating cost function derivatives $\partial F / \partial Z_j$
 - makes the optimizer take a faulty direction for the next major step.
- Increasing EPSFCN by a factor of 10 ($\rightarrow 5.e-2$) does not have the intended effect. (See Fig 5)
- We could try different step lengths, but even if we found one that worked for this case (got us over the hump) this would not be a satisfactory solution for future applications (where we don't know what lies over the next hill). i.e., I am not going to try this!

Finally, let me show a plot showing details of the minor and major iteration steps along the path from c10 to c10p.

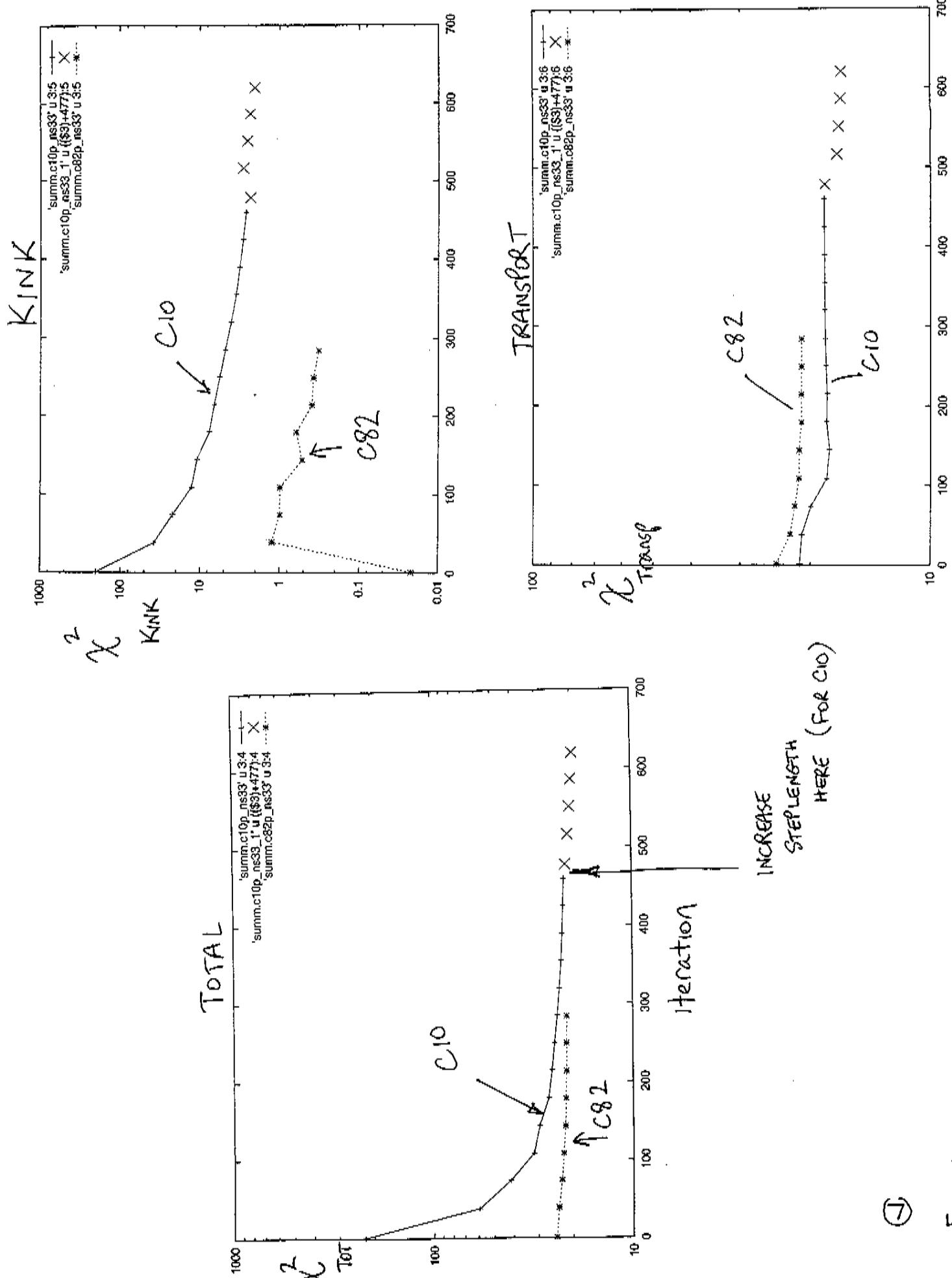
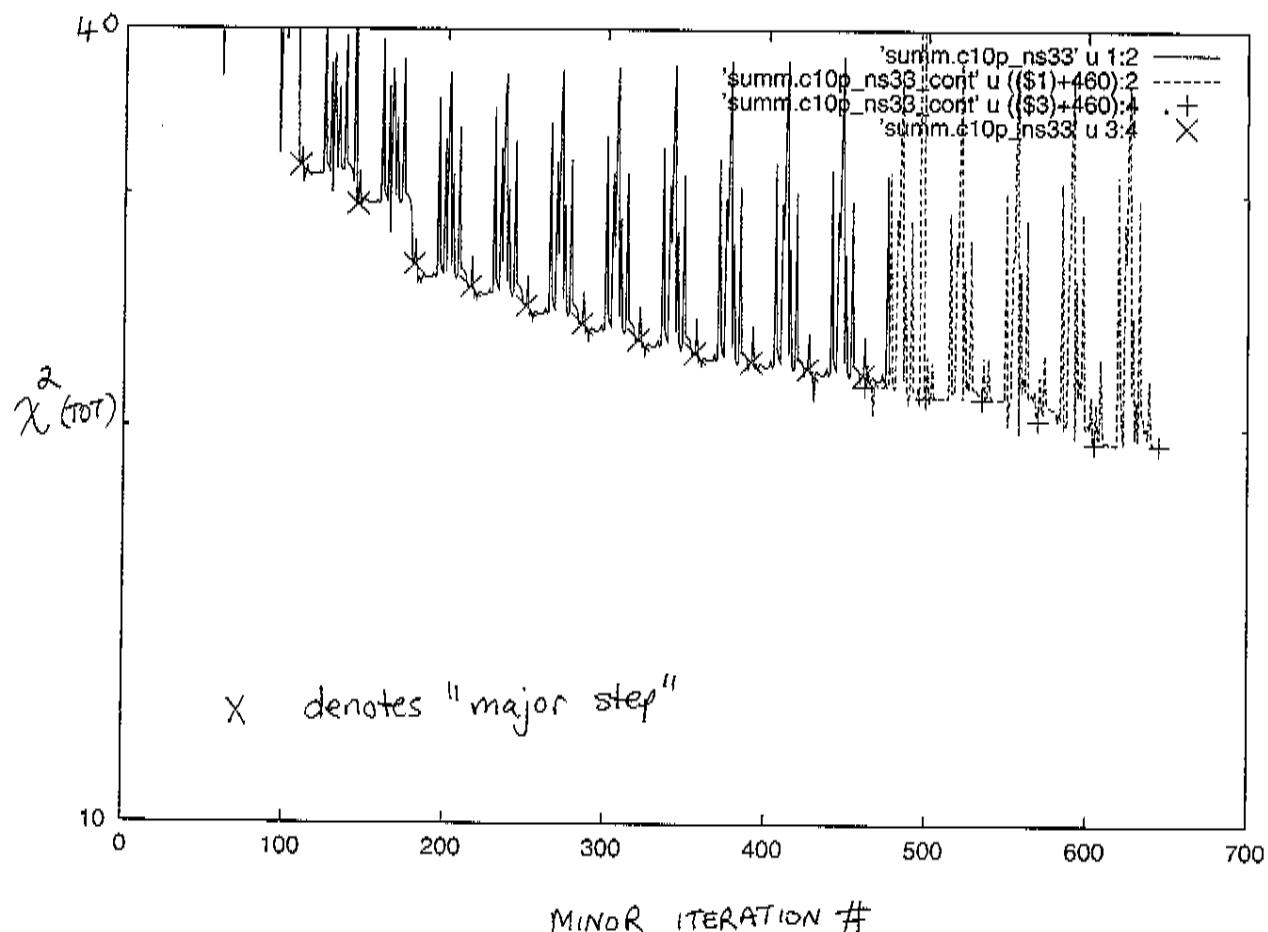


Fig. 5



- The cost function value given by the optimizer AFTER taking a major step can be GREATER than some of the values obtained in the numerical evaluation of derivatives!
 - Is this dumb, or is this necessary?

Now return to the rest of Harry's talk!