

# Running VARYPED and ELITE

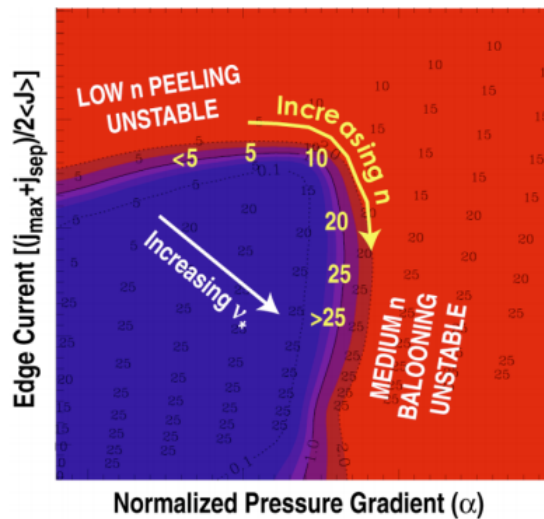
---

## DISCLAIMER:

This is an editable public document! When you make a change to it, it will be visible immediately by everyone! Feel free to edit it and help other OMFIT users!

---

The final goal of running these codes is to map out the stability diagram of a shot as such



<https://doi.org/10.1088/1742-6596/123/1/012014>

To do this you will need a shot you are familiar with where you have already created:

1. A kineticEFIT (g-file, and a-file)
2. A pFile

VARYPED is an OMFIT module that takes a kinetic EFIT and perturbs in alpha (normalized pressure gradient), and j (bootstrap current) space to create a set of g-files represented by each grid point above.

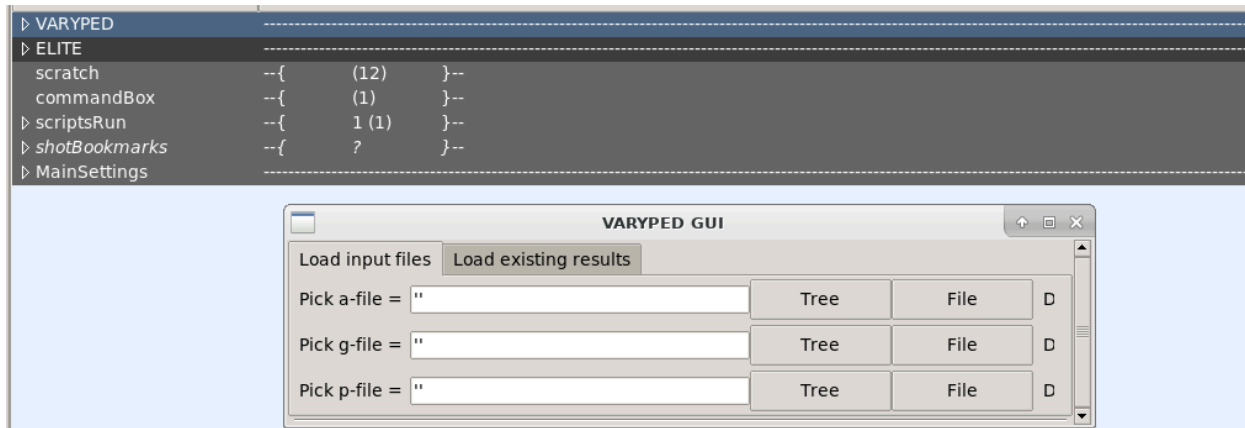
ELITE is an MHD stability code which takes an equilibrium and calculates the growth rate of a single or several mode numbers. ELITE must be run for the mode numbers you are interested in (usually between 5-25 and up to 45)

It is recommended that the VARYPED & ELITE batch scripts be run on a computing cluster because they take advantage of parallelization. This example is run on iris.

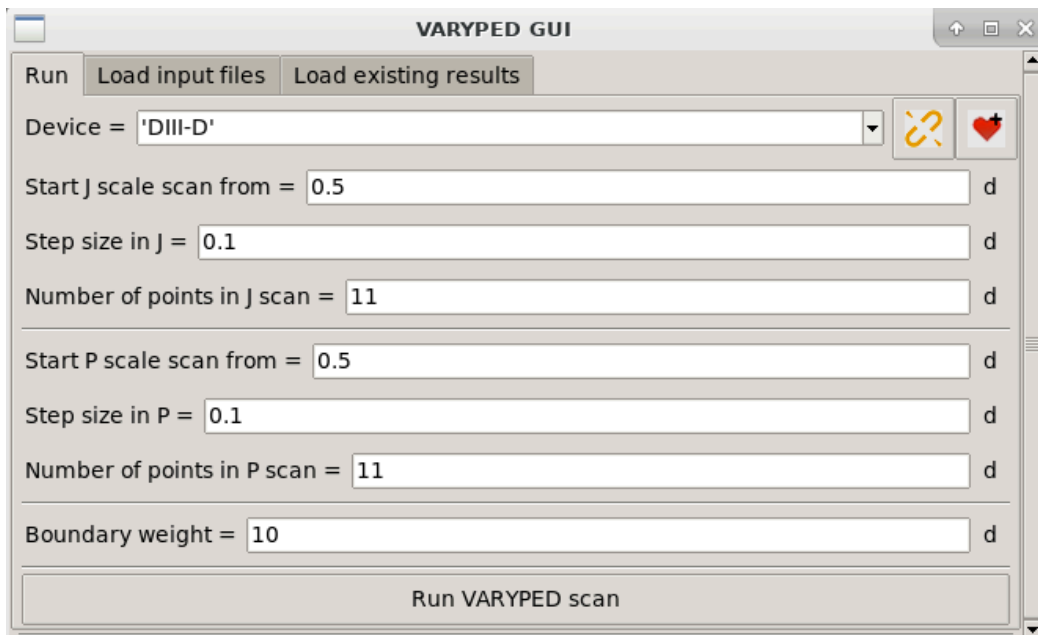
**Letters in bold represent a button click or parameter to change**

## Open an OMFIT instance and import VARYPED and ELITE

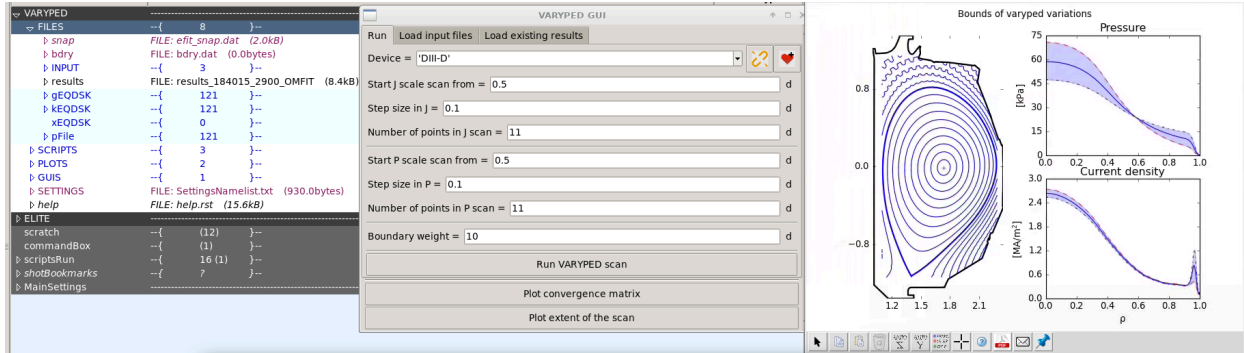
Summon the VARYPED GUI (double click the varyped module name) and import the g, a, and pFile from the tree or a file)



Select the grid parameters for your VARYPED scan



**Start X scale scan from** is a fraction of the kineticEFIT parameter at the edge. Here we will run from 0.5 to 1.5 in increments of 0.1. The total grid size is (number of points in J) x (number of points in P) so we will have a total of 121 grid points.

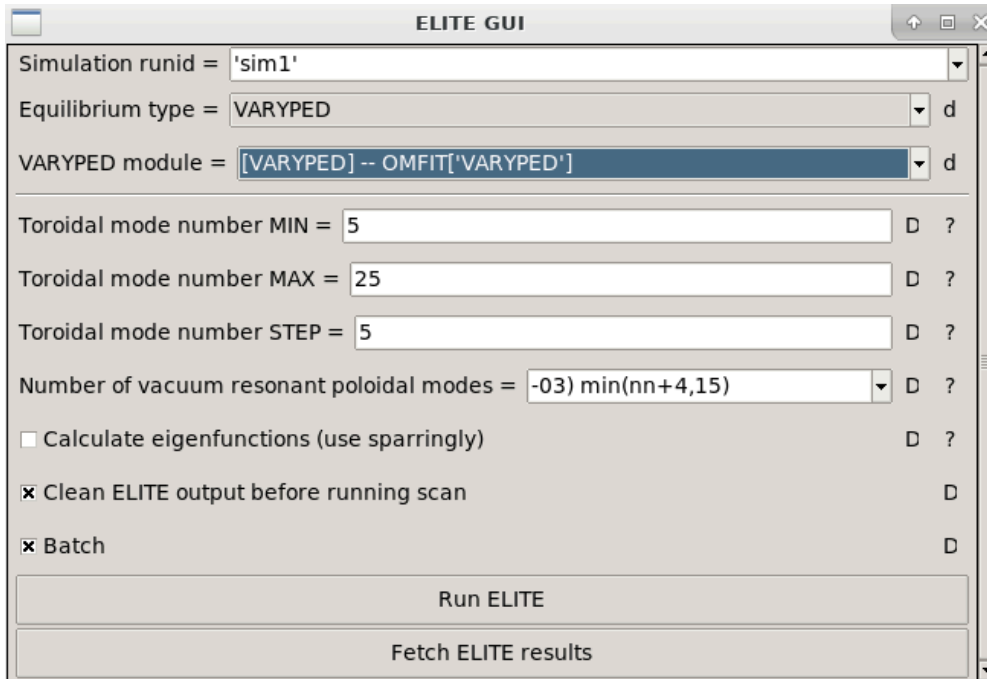


After the code completes and after **plot extent of scan** you should see:

Now enter the ELITE GUI and select VARYPED as the input:



Then choose the variedped module as the source of the inputs:



Choose the mode numbers you want to analyze and the step size. These defaults work pretty well and click **Run ELITE**

Go grab lunch. This will take anywhere from 10s of minutes to a few hours depending on how many ELITE instances must run. As an estimate:

2.5 minutes per elite mode number calculation \* number of ELITE modes \* number of grid points / number of nodes (20 for iris) = time to run.

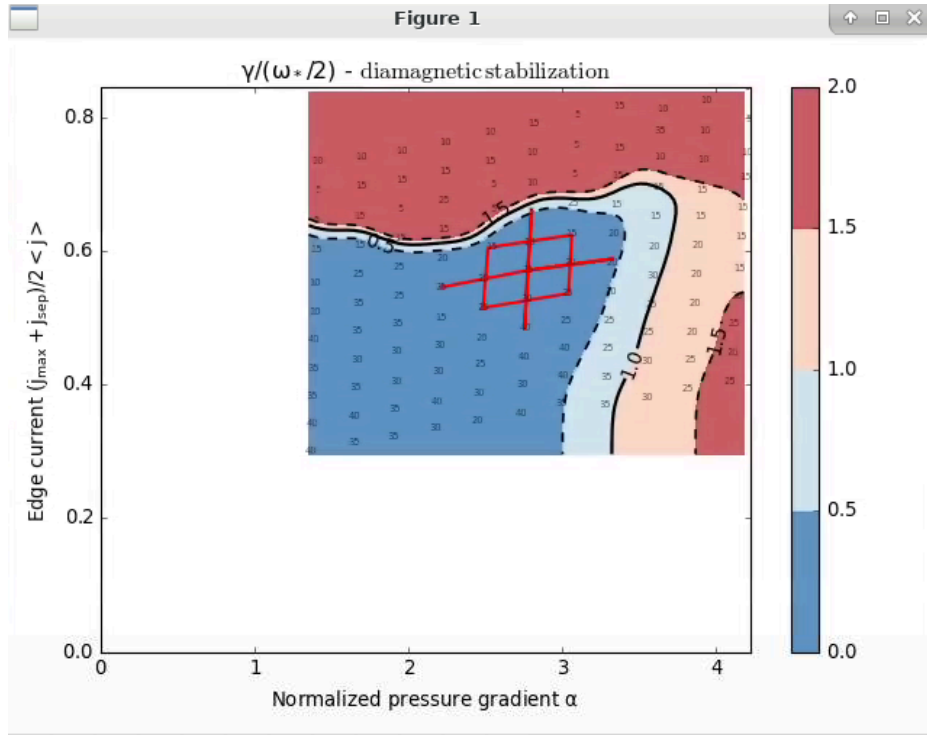
In this example  $2.5 * (5) * (121) / 20 = 75$  minutes.

Finally **Plot ELITE Results**

The screenshot shows the ELITE GUI interface with the following settings:

- Simulation runid = 'sim1'
- Equilibrium type = VARYPED
- VARYPED module = [VARYPED] -- OMFIT['VARYPED']
- Toroidal mode number MIN = 5
- Toroidal mode number MAX = 25
- Toroidal mode number STEP = 5
- Number of vacuum resonant poloidal modes = -03) min(nn+4,15)
- Calculate eigenfunctions (use sparingly)
- Clean ELITE output before running scan
- Batch
- Run ELITE button
- Fetch ELITE results button
- Surface smoothing = 0.1
- Write mode numbers
- Text size = 6
- Experimental uncertainty = 0.1
- Clip max value = 2
- Clip plot domain
- Quantity to plot = Normalized growth rates (diamag. stabilization)
- Plot ELITE results button

Output:



Congratulations! Now go Physics!