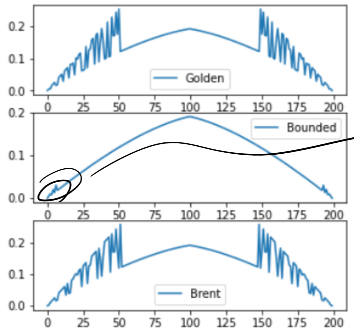
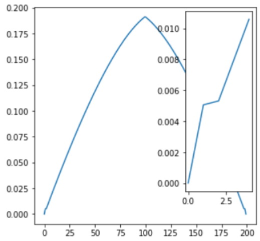
Recap Dynamic prog.

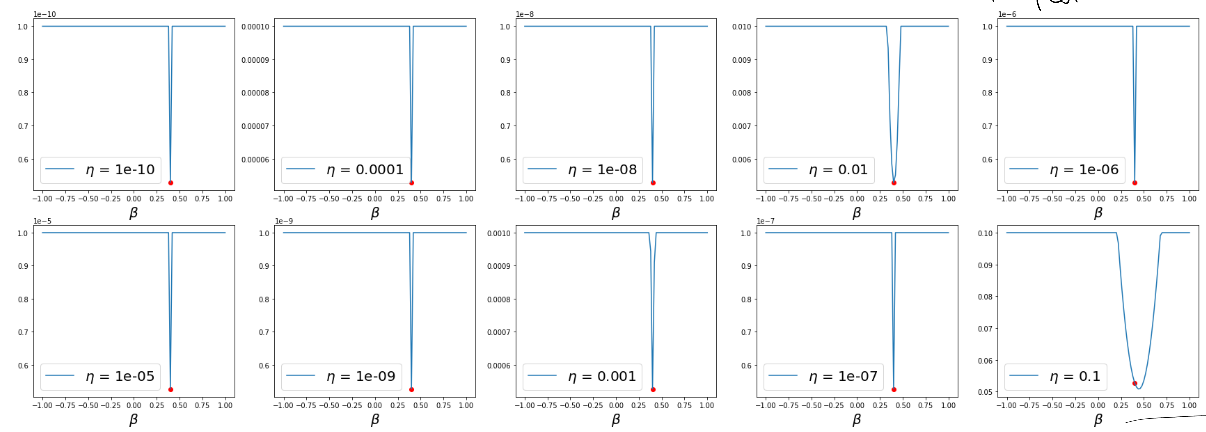
Optimizing Kennedy.

```python
plt.figure(figsize=(5,5))
for ind,method in enumerate(ps.keys()):
    ax=plt.subplot2grid((3,1),(ind,0))
    ax.plot(ps[method], label=method)
    ax.legend()
```





this errors are due to the optimization landscape. It's easy to see $\beta^o \to \alpha$ when $\eta \to 0$



this is easy to see since $P_s = \eta e^{-|\alpha+\beta|^2} + (1-\eta) e^{-|\alpha-\beta|^2}$

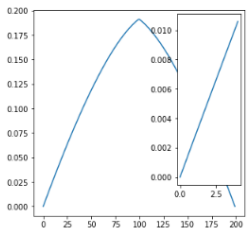
$\eta \to 0$
1 goal

best thing is to make the to zero.

Using this trick in the form of bounds, we solve the problem.

```python
give_lim= lambda eta,a : 2 if eta>0.01 else a


etas_min = np.linspace(1e-10,.5,100)
PS = np.zeros((1,2*len(etas_min)))
BOPT = np.zeros((1,2*len(etas_min)))
for ind_eta, eta in enumerate(tqdm(etas_min)):

    if eta>0.01:
        bd = ((-2,2))
    else:
        bd = ((alpha-1e-5,alpha+1e-5))

    optimization = optimize.minimize_scalar(P_1, args
    PS[0,ind_eta]=optimization.fun
    BOPT[0,ind_eta]=optimization.x

PS[0,len(etas_min):] = PS[0,:len(etas_min)][::-1]
BOPT[0,len(etas_min):] = -BOPT[0,:len(etas_min)][::-1


from mpl_toolkits.axes_grid1.inset_locator import zoo
fig=plt.figure(figsize=(5,5))
ax = plt.subplot(111)
ax.plot(PS[0])
axins = zoomed_inset_axes(ax, zoom=15)#,loc="lower ri
axins.plot(PS[0][:5])
```

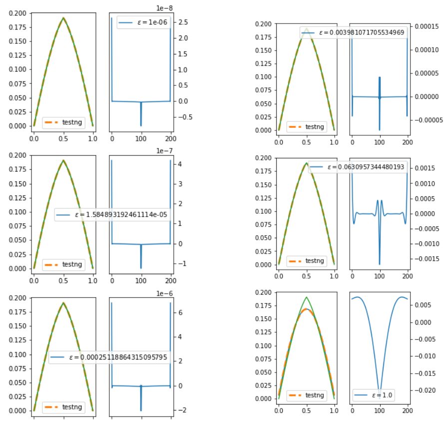
```
100%|██████████| 100/100 [00:00<00:00, 625.80it/s]
[<matplotlib.lines.Line2D at 0x7f6a8054b6a0>]
```



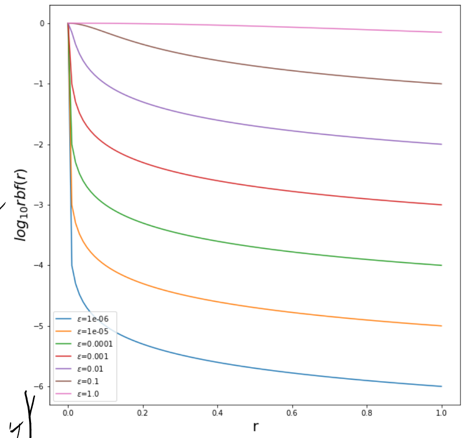
Interpolation: radial basis function

$$f_\varepsilon(r) = \sqrt{\left(\frac{r}{\varepsilon}\right)^2 + 1}$$

default ε approximately avg distance between nodes.

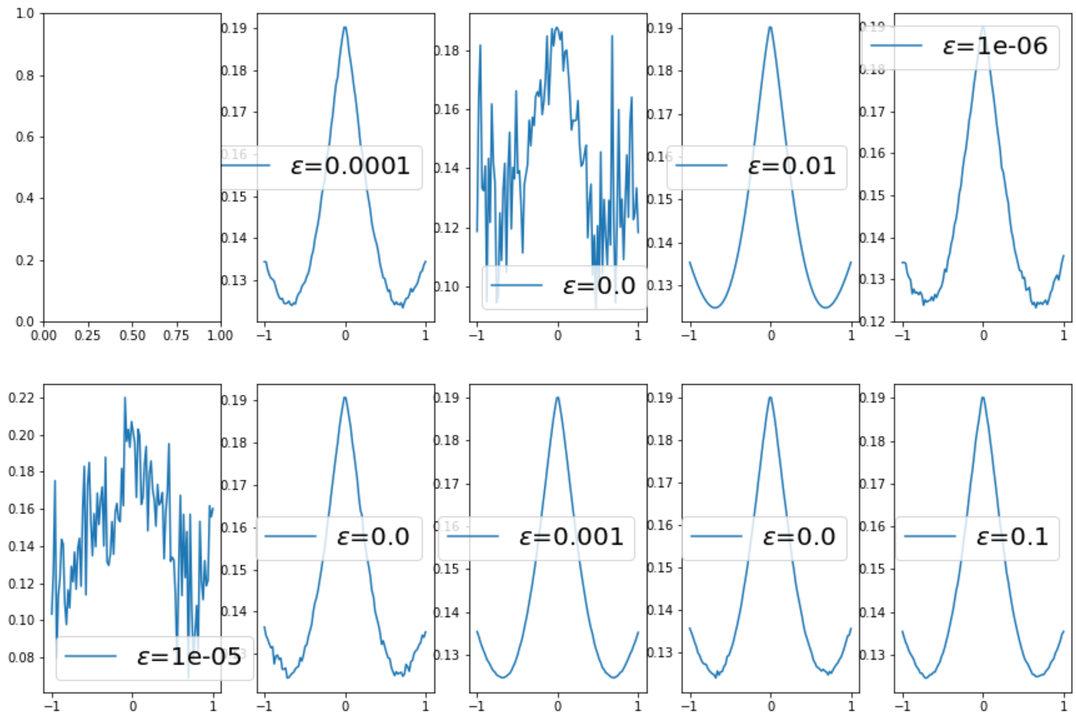


RBF for diff ε.

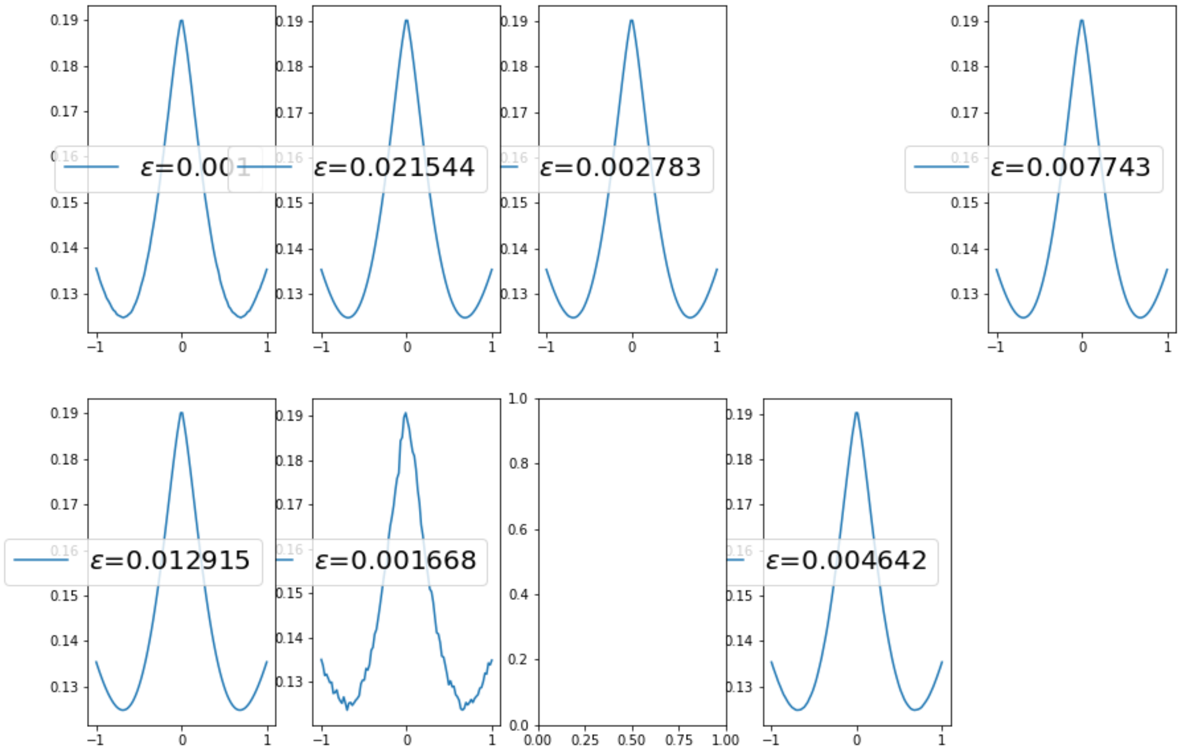


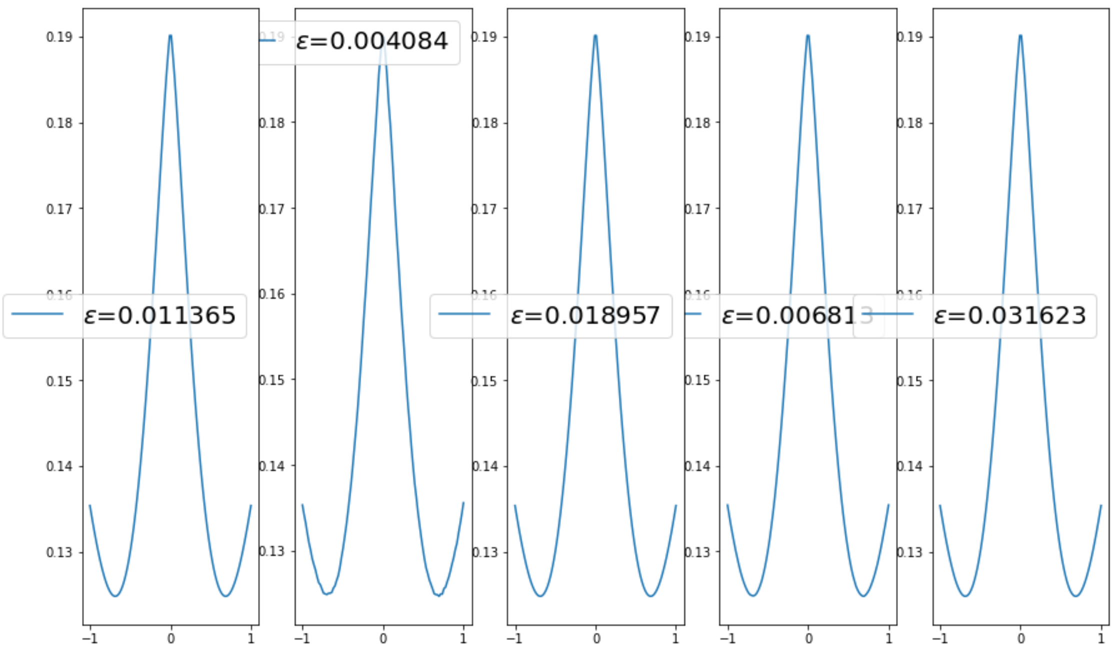
- Note there's also a smooth parameter (which does not give the exact value at the point and thus we don't want it)

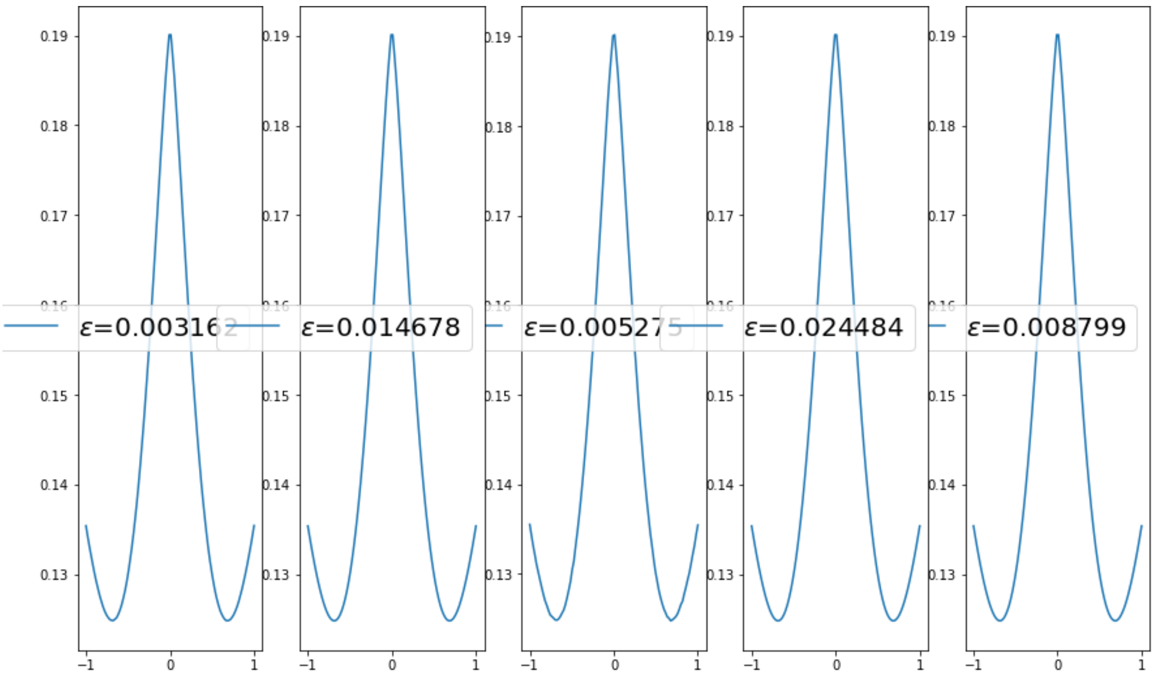
- Interpolate Kennedy and check optimization landscape for different ε



Closer to nice region.



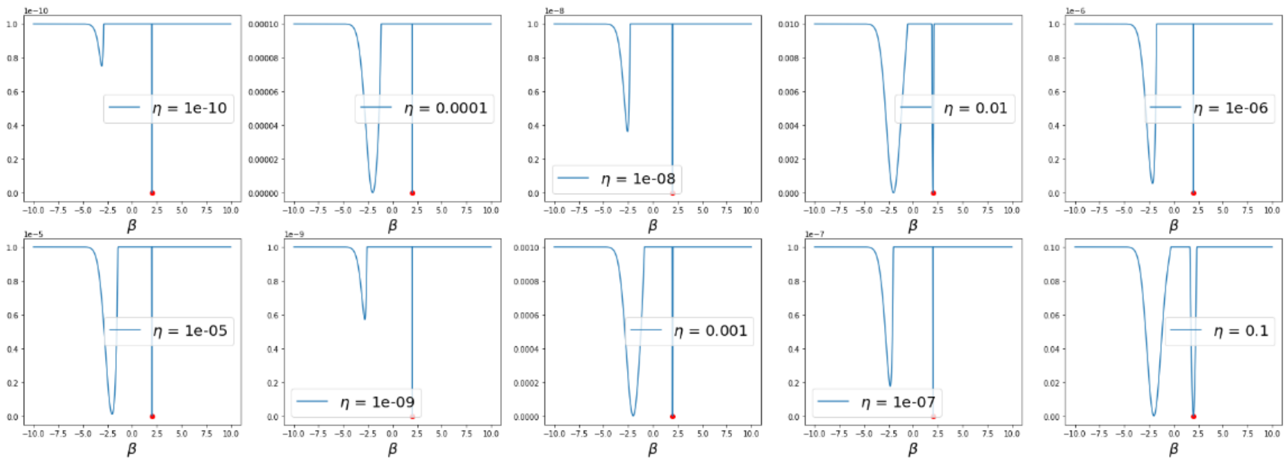




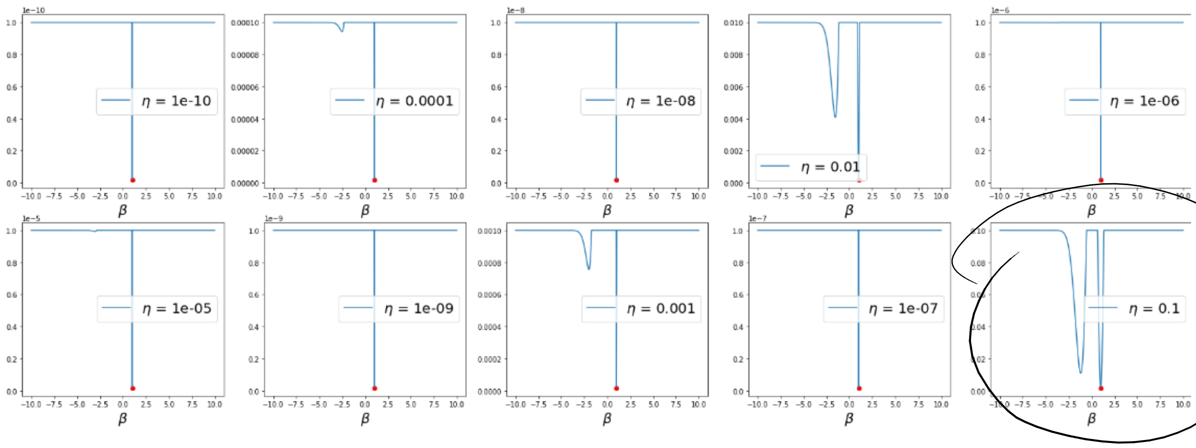
$\varepsilon \simeq 0.02$ seems ok

Although this depend on the # of points that you use..

Note that for $\alpha \geq 1$ this is also valid. ($\alpha = 2$ here)

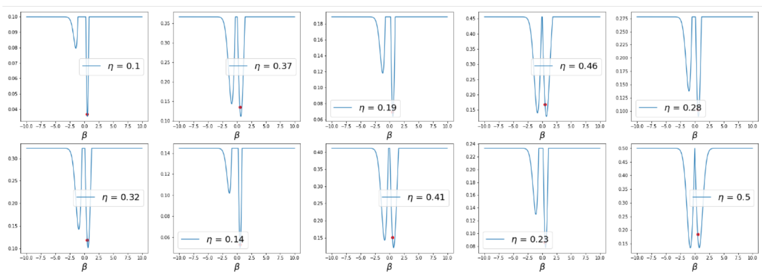


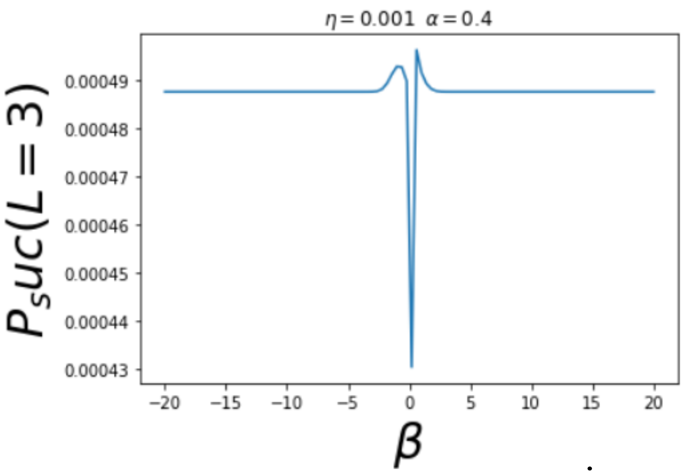
$L=1$

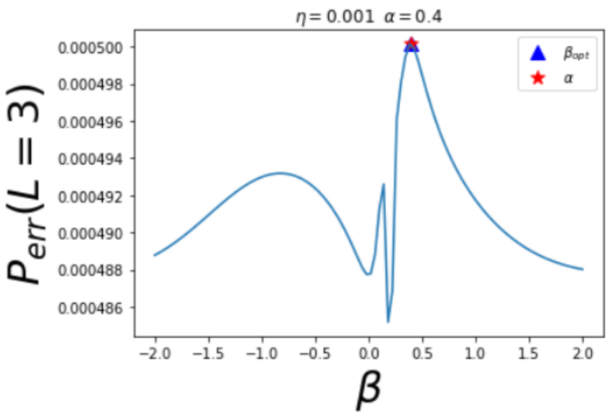


Dangh!

BFGS







dual annealing

$x_0 = 0$

surprising results!