In [1]:
```
import numpy as np
from scipy.integrate import odeint
%matplotlib inline
import matplotlib.pyplot as plt
from matplotlib.backends.backend_pdf import PdfPages
import sys
```

In [2]:
```
t = np.linspace(0,50395, num=10080)
lightdata = np.transpose(np.delete(np.genfromtxt('AllLightnosmooth.csv', delimiter=',')


def func(t):
    z0 = [1,0,0,0,0,0]
    #mCherry2 = np.empty((len(lightdata[:,0]), len(t)))
    out =  np.empty((len(lightdata[:,0]),len(t),6))
    arrayvalues = np.asarray([])
    #for i in range(42):
    for i in range(len(lightdata[:,0])):
        def I(t):
            tindex = t/5
            if tindex > 10079:
                tindex = 10079
            return lightdata[i][int(tindex)]

        def model(z,t):
            d1 = 0.019905
            k1 = 0.08299
            d2 = 0.116948
            k2 = 0.001023
            Kd = 90.41
            n = 0.964487
            k3 = 0.000432
            d3 = 0.000544
            k4 = 1.25
            d4 = 0.0000924
            k5 = 0.00144



            Pu = z[0]
            Pb = z[1]
            Pa = z[2]
            mRNA = z[3]
            mCherry1 = z[4]
            mCherry2 = z[5]

            dPudt = d1*Pb - k1*I(t)**n/(Kd**n+I(t)**n)*Pu
            dPbdt = k1*I(t)**n/(Kd**n+I(t)**n)*Pu + d2*Pa - d1*Pb - k2*Pb
            dPadt = k2*Pb - d2*Pa
            dmRNAdt = k3*Pa - d3*mRNA
            dmCherry1dt = k4*mRNA-(d4 + k5)*mCherry1
            dmCherry2dt = k5*mCherry1-d4*mCherry2
            return [dPudt,dPbdt,dPadt,dmRNAdt,dmCherry1dt,dmCherry2dt]

        z = odeint(model,z0,t)
        #mCherry2[i] = z[:,5]
        out[i] = z
    return out
```

In [3]:
```
model1 = np.asarray(func(t))
mCherry2 = model1[:,:,5]
Pu = model1[:,:,0]
Pb = model1[:,:,1]
Pa = model1[:,:,2]
mRNA = model1[:,:,3]

#total = Pu+Pb+Pa+Pi
#print(total)

#for i in range(42):
for i in range(len(lightdata[:,0])):
    last = mCherry2[i]
    ##total = Pi[i]+Pu[i]+Pb[i]+Pa[i]
    print(last[-1])
```

```
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```

```
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```

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```

In [4]:

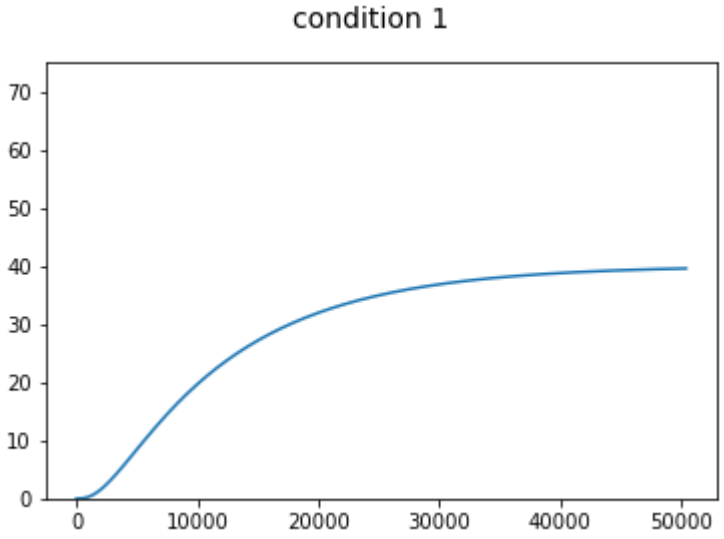
```
import csv
pp = PdfPages('multipage.pdf')

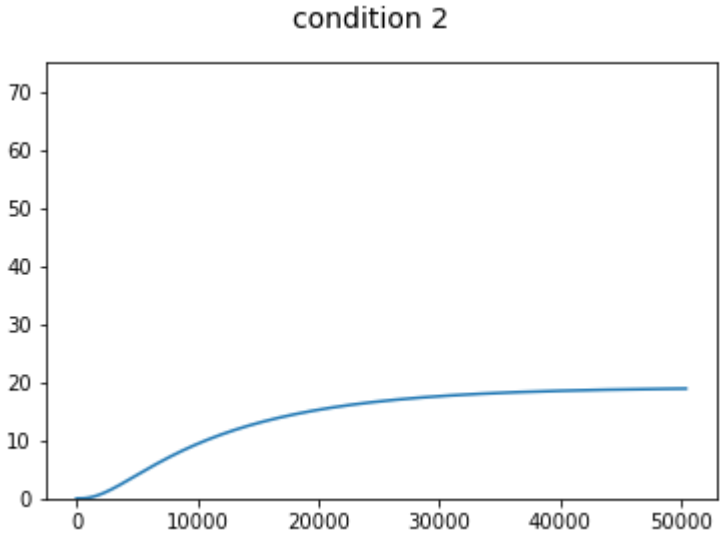
#for i in range(42):
for i in range(len(lightdata[:,0])):
#    mCherry2 = model1[:,:,6]
#    with open('dataout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in mCherry2:
#            csvwriter.writerow(row)
#    Pu = model1[:,:,0]
#    with open('Puout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in Pu:
#            csvwriter.writerow(row)
#    Pb = model1[:,:,1]
#    with open('Pbout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in Pb:
#            csvwriter.writerow(row)
#    Pi = model1[:,:,2]
#    with open('Piout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in Pi:
#            csvwriter.writerow(row)
#    Pa = model1[:,:,3]
#    with open('Paout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in Pa:
#            csvwriter.writerow(row)
#    mRNA = model1[:,:,4]
#    with open('mRNAout.csv','w') as csvfile:
#        csvwriter=csv.writer(csvfile)
#        for row in mRNA:
#            csvwriter.writerow(row)
    #U=U*100;
    #Pu=Pu*100;
    #Pb=Pb*100;
    #Pa=Pa*100;
    #t = np.linspace(0,50395, num=10080)
    #plt.plot(t,U[i])
    #plt.plot(t,Pu[i])
    #plt.plot(t,Pb[i])
    #plt.plot(t,Pa[i])
    #plt.legend(['U','Pu','Pb','Pa'])
    #plt.plot(t,lightdata[i])
    plt.plot(t,mCherry2[i])
    #plt.xlabel('Time [s]')
    #plt.ylabel('Fluoresence [a.u.]')
    plt. suptitle('condition '+str(i+1),fontsize = 14)
    plt.ylim((0,75))

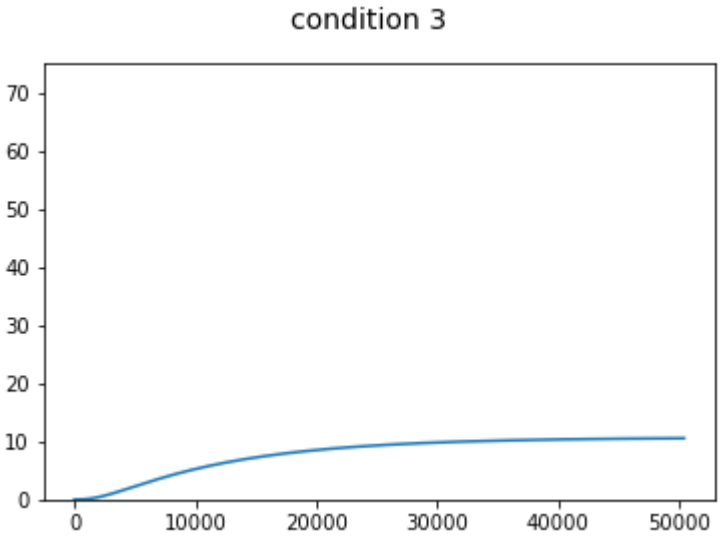

    #def annot_max (t, mCherry2, ax=None):
    #    tmax = t[np.argmax(mCherry2[i])]
```

```
    #    ymax = mCherry2[i].max()
    #    text = "t={:.3f}, y={:.3f}".format(tmax,ymax)
    #    print(i+1, ymax)
    #    if not ax:
    #        ax=plt.gca()
    #    bbox_props = dict(boxstyle = "square,pad=0.3", fc="w", ec="k",lw=0.72)
    #    arrowprops = dict(arrowstyle="->", connectionstyle = "angle,angleA=0,angleB=60
    #    kw = dict(xycoords='data', textcoords="axes fraction", arrowprops=arrowprops,
    #    ax.annotate(text,xy=(tmax,ymax), xytext=(0.94,0.7), **kw)
    #annot_max(t,mCherry2)
    pp.savefig()
    plt.show()

pp.close()
```



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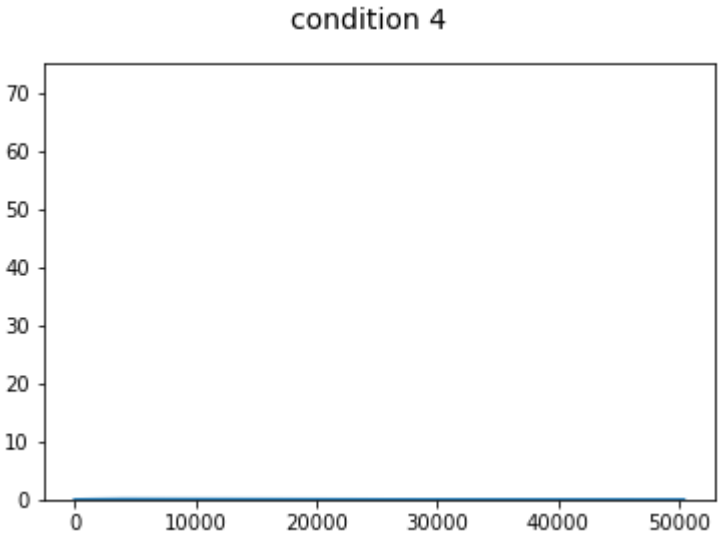
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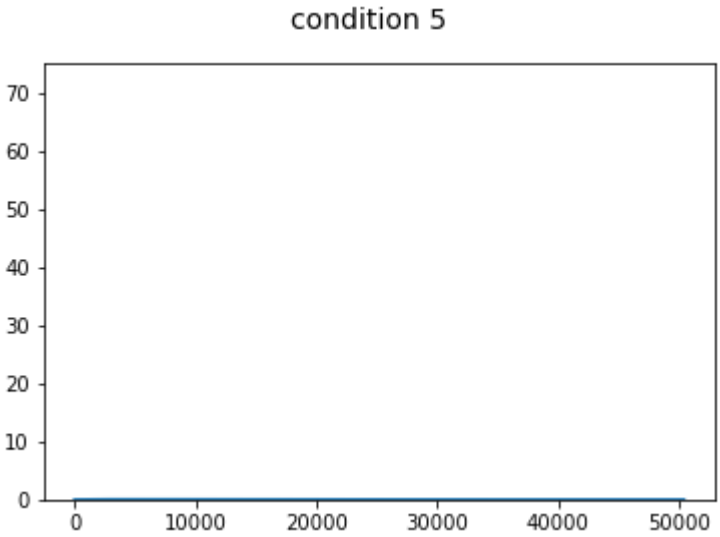
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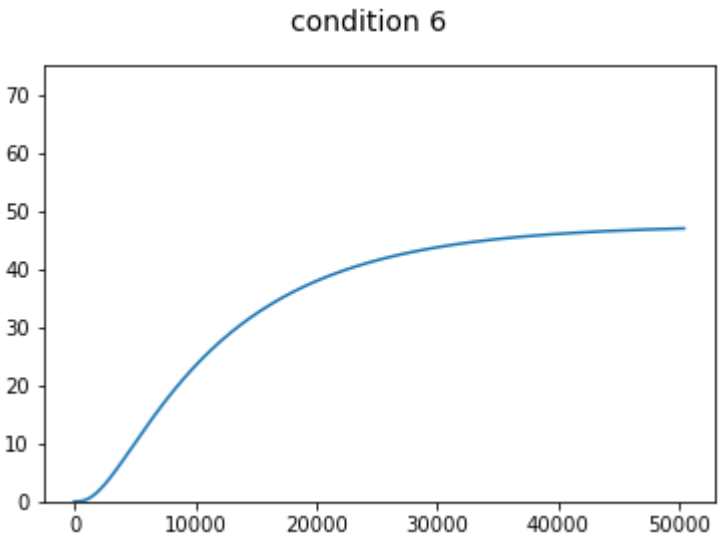
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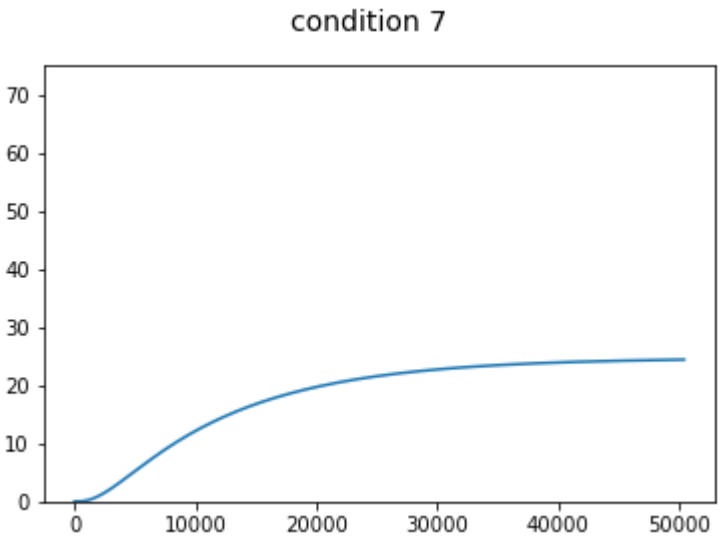
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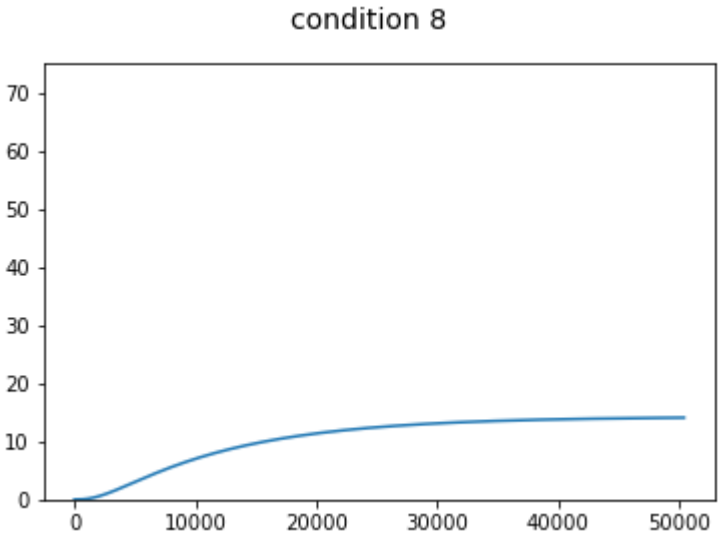
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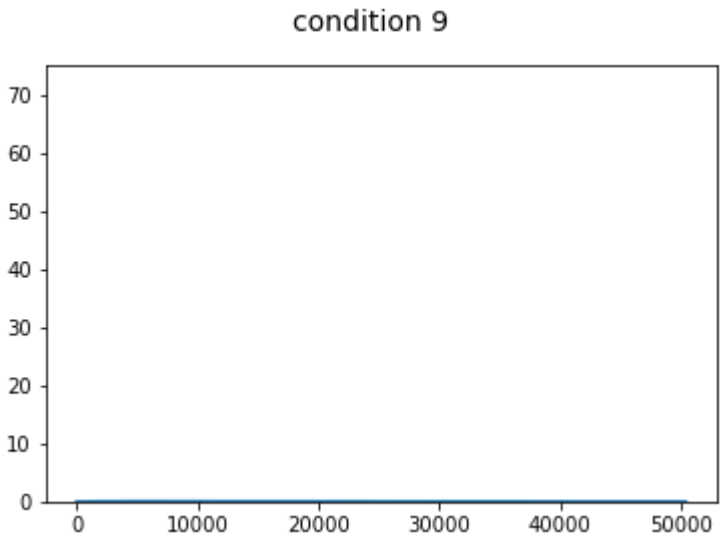
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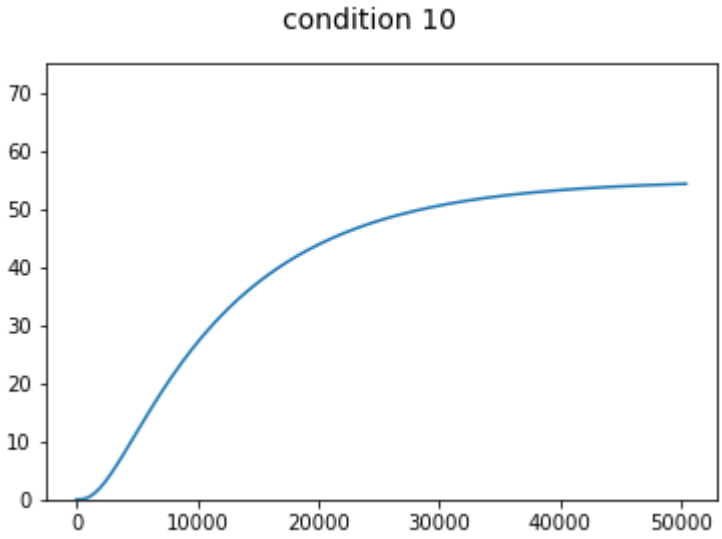
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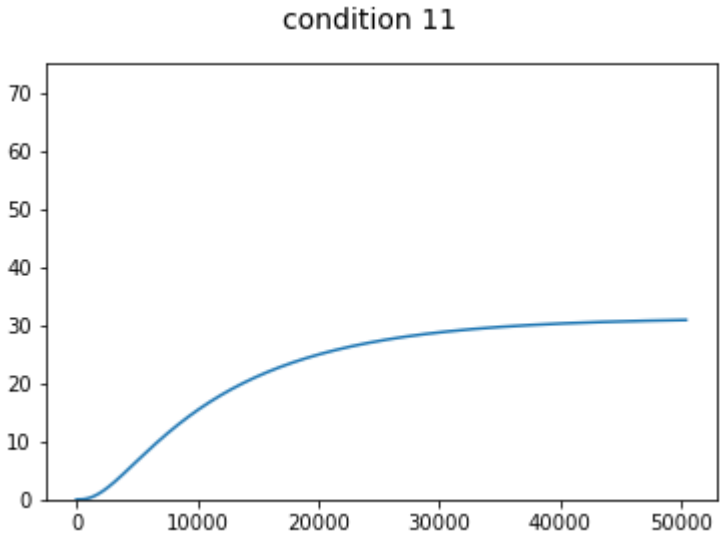
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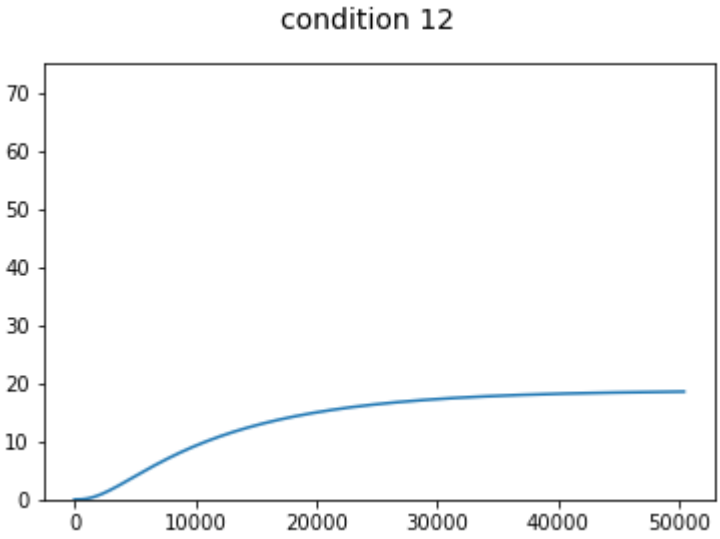
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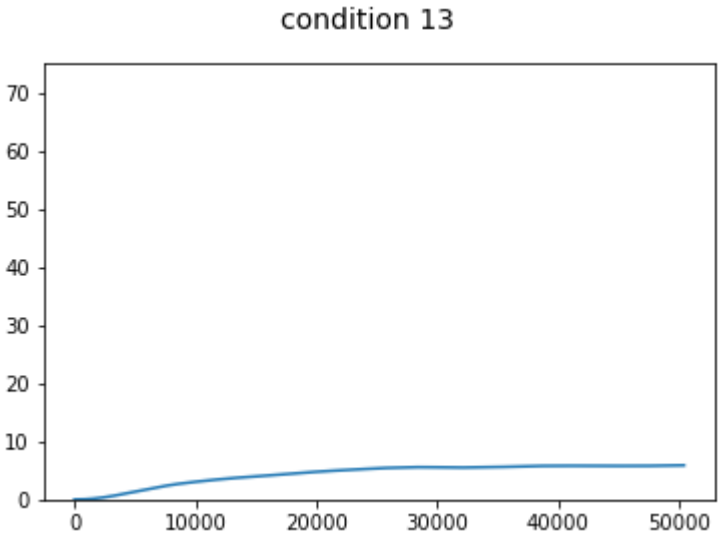
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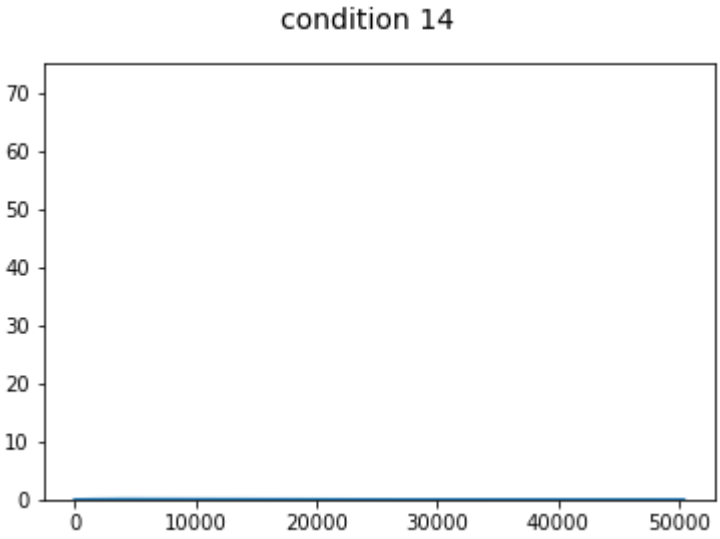
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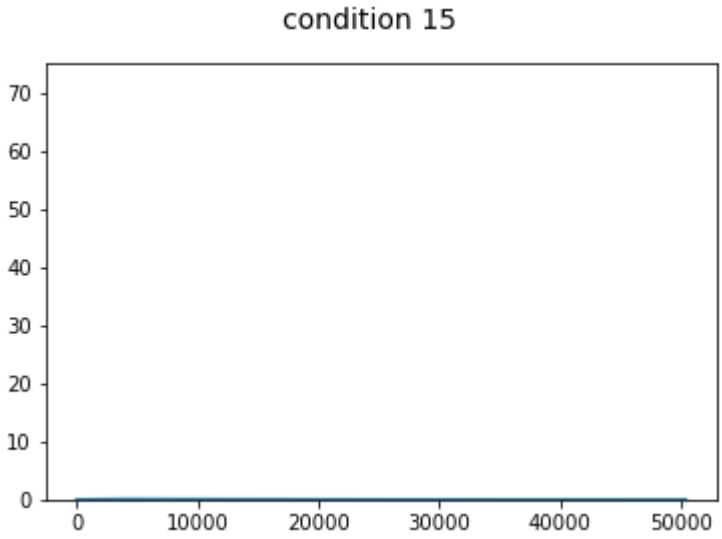
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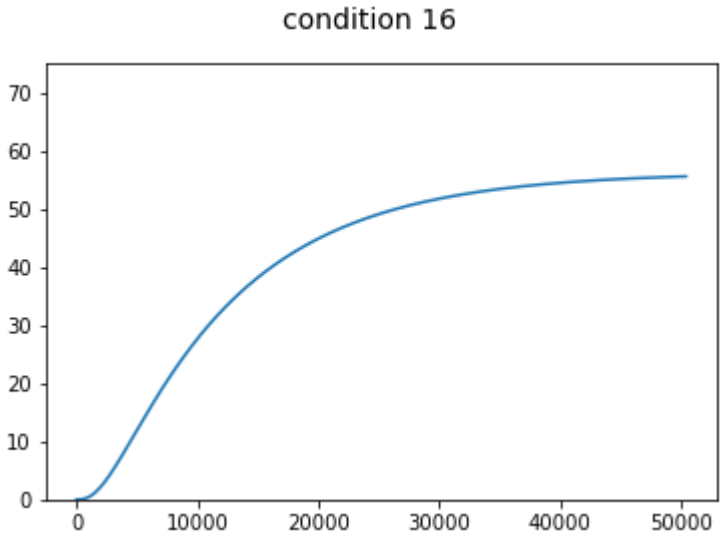
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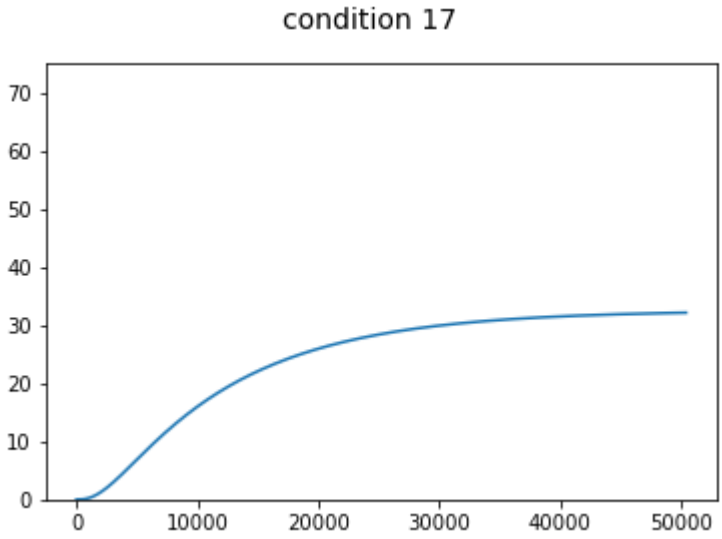
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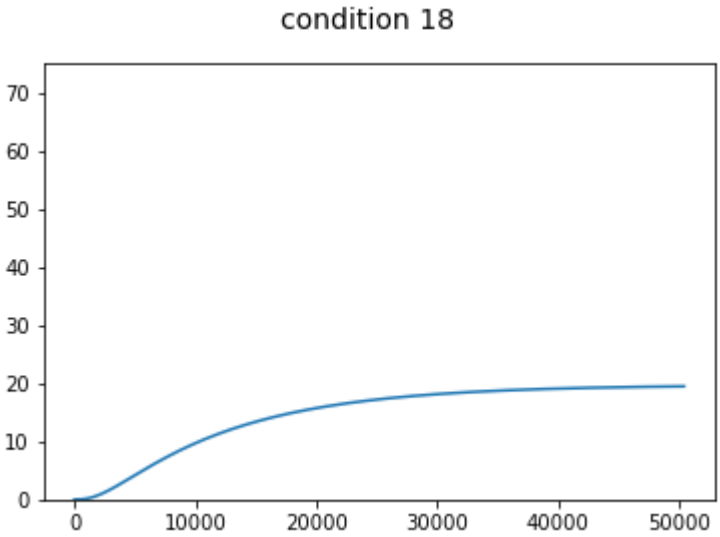
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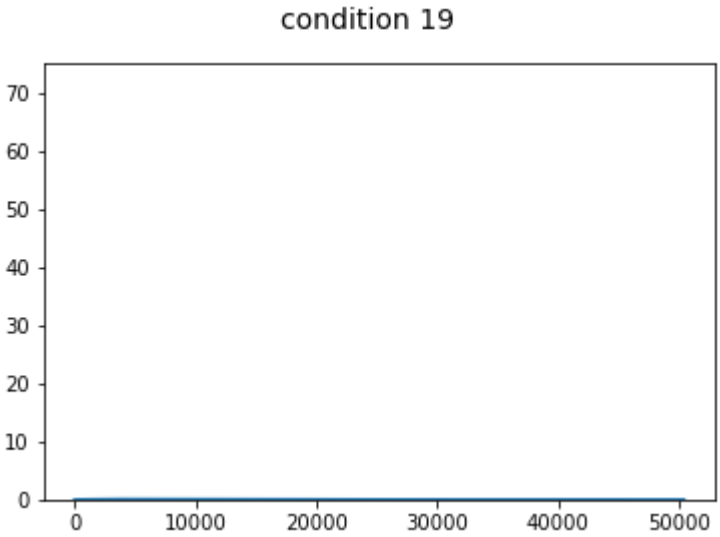
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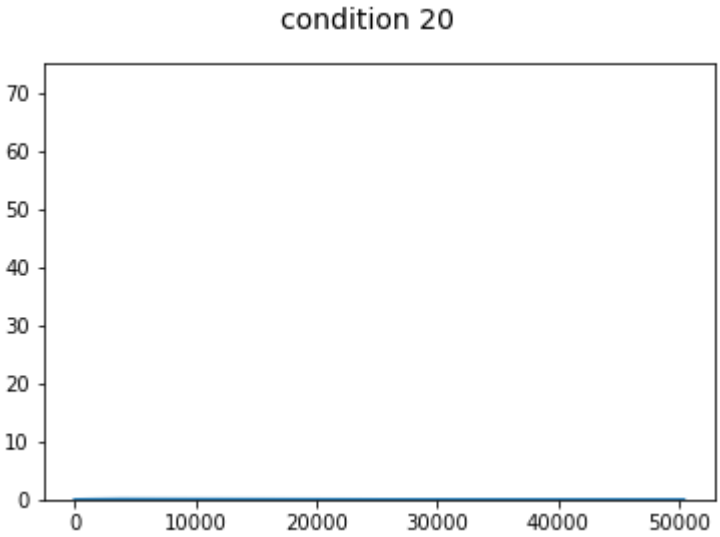
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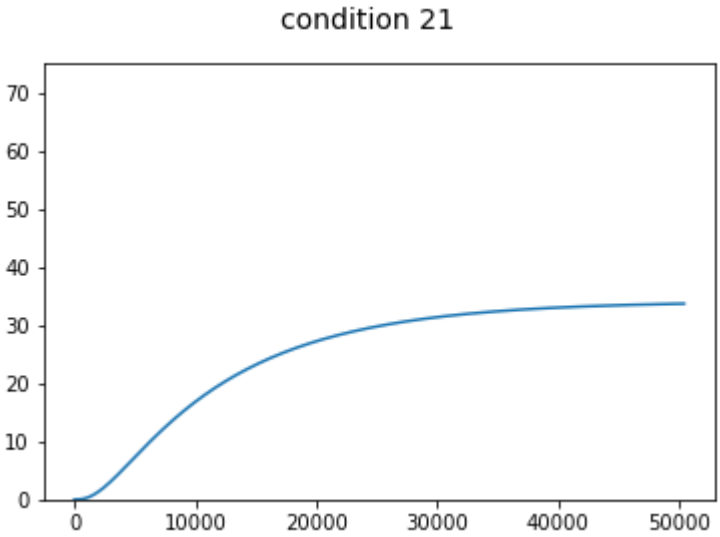
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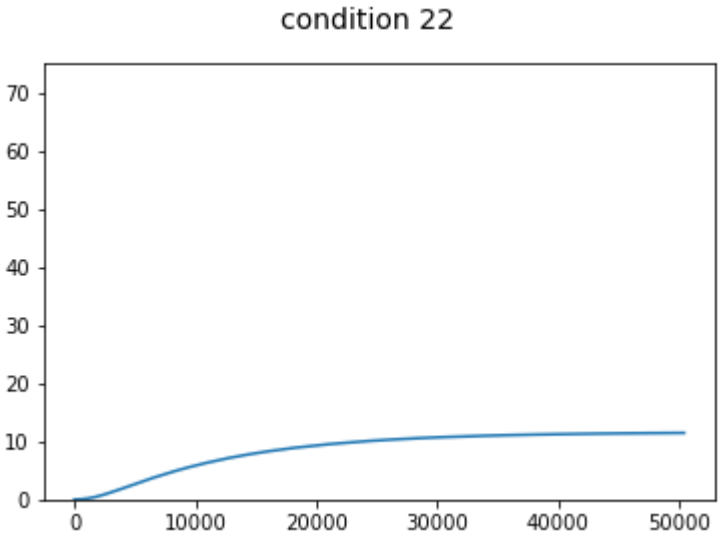
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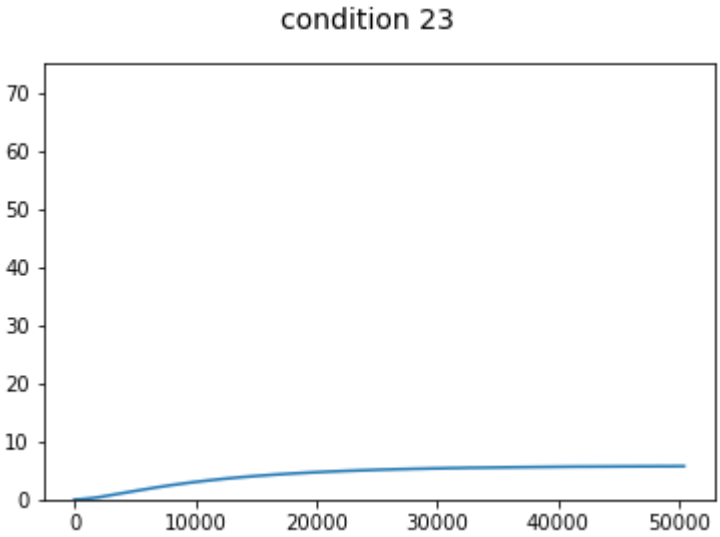
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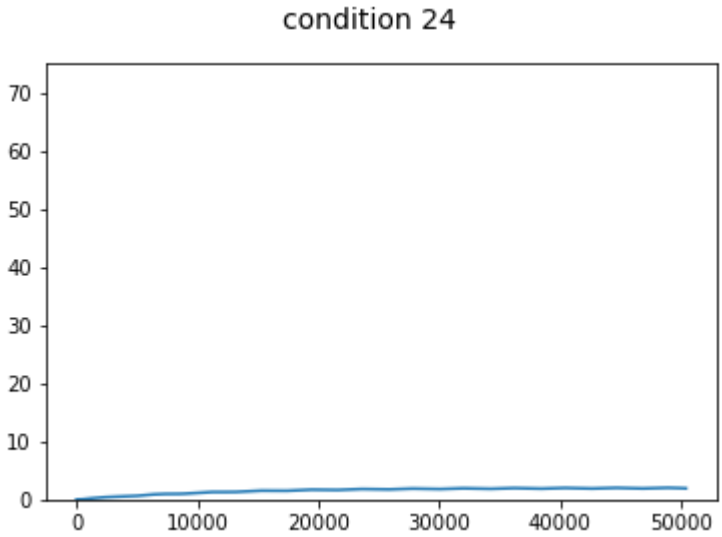
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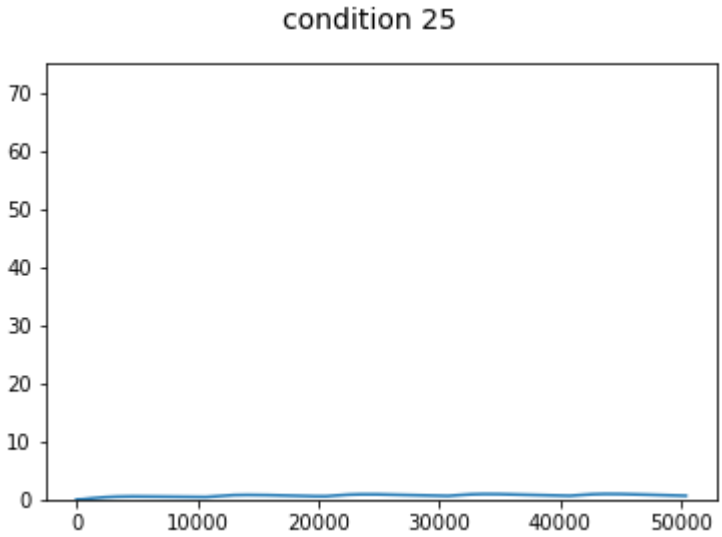
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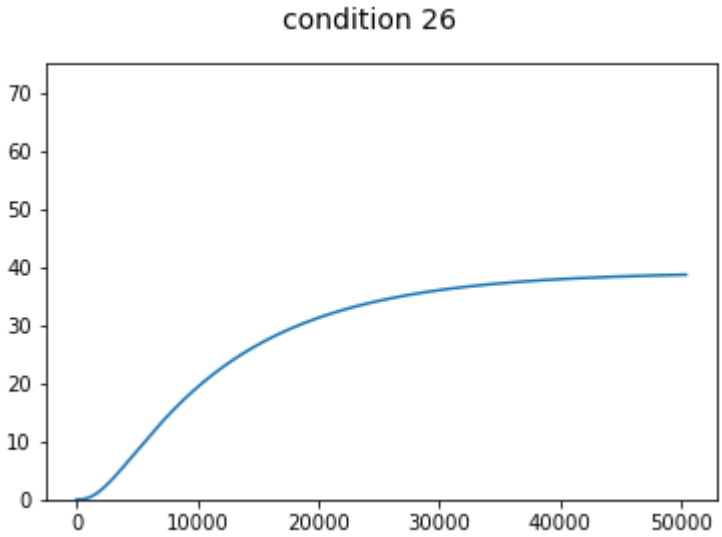
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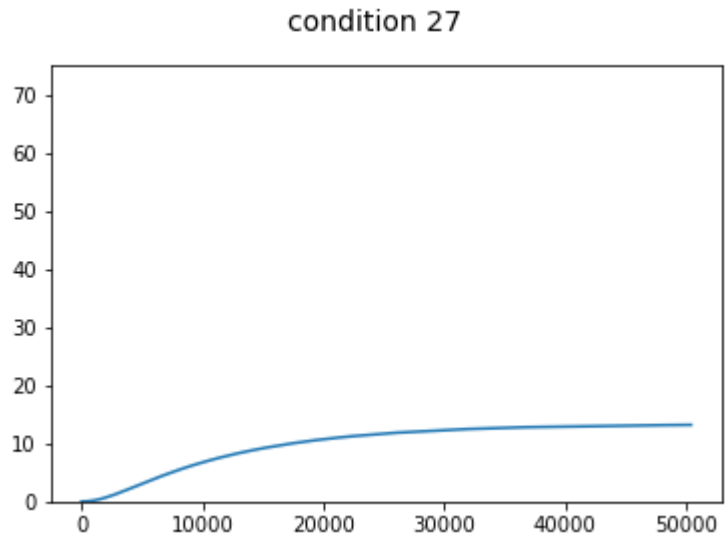
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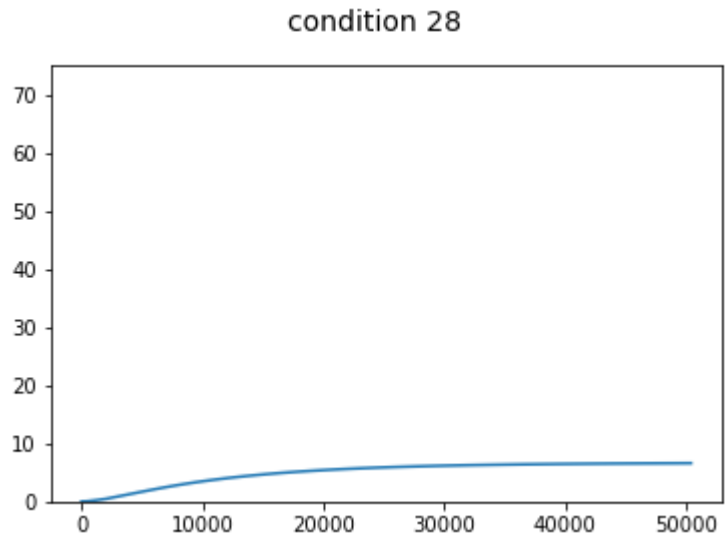
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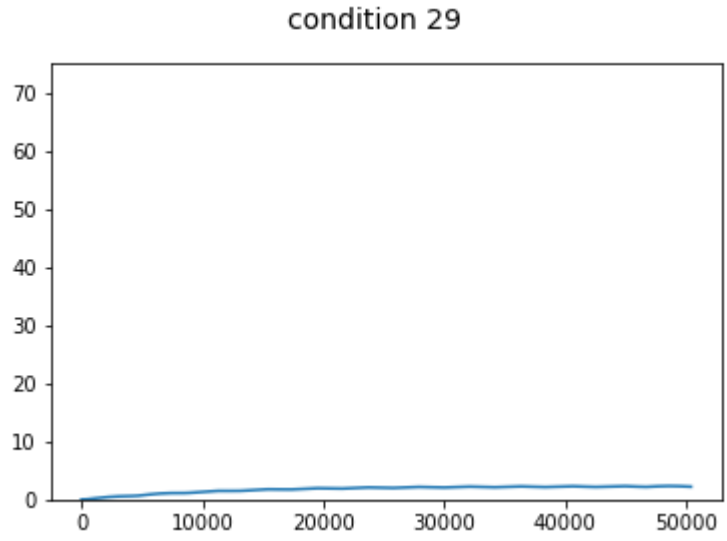
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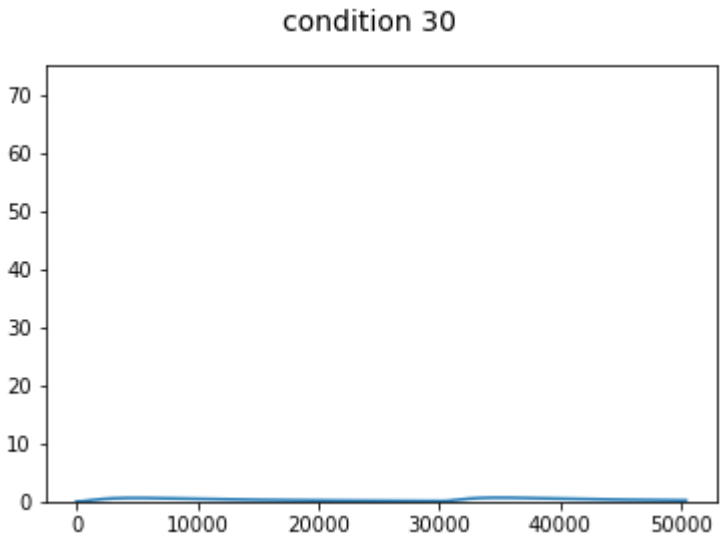
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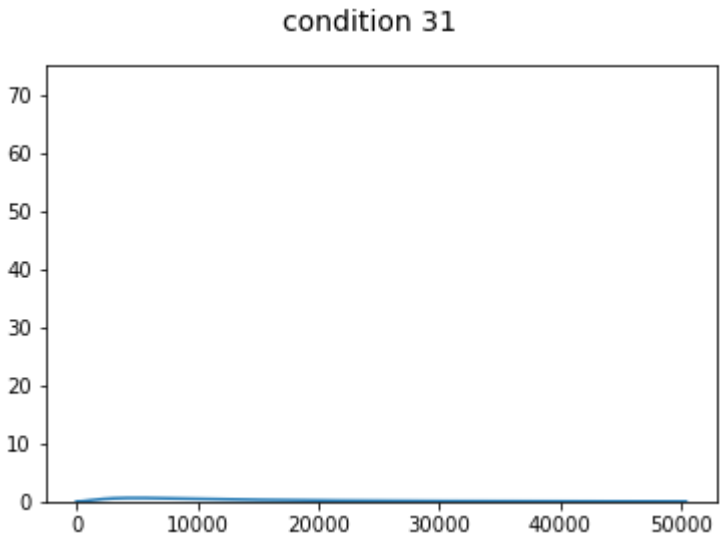
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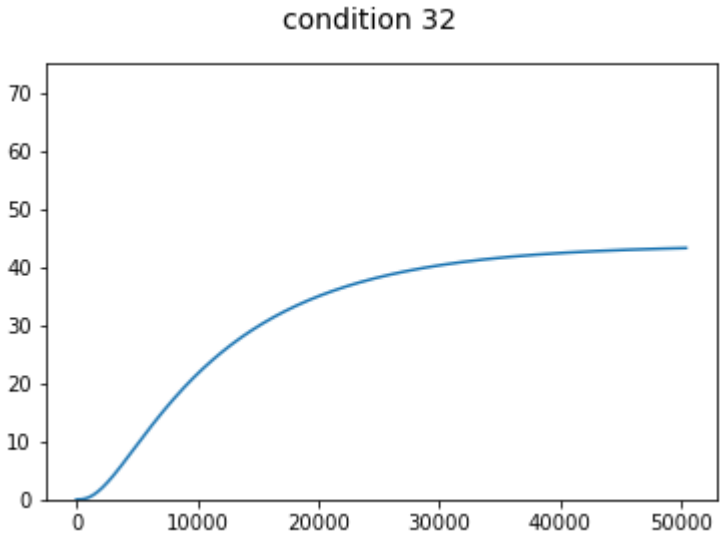
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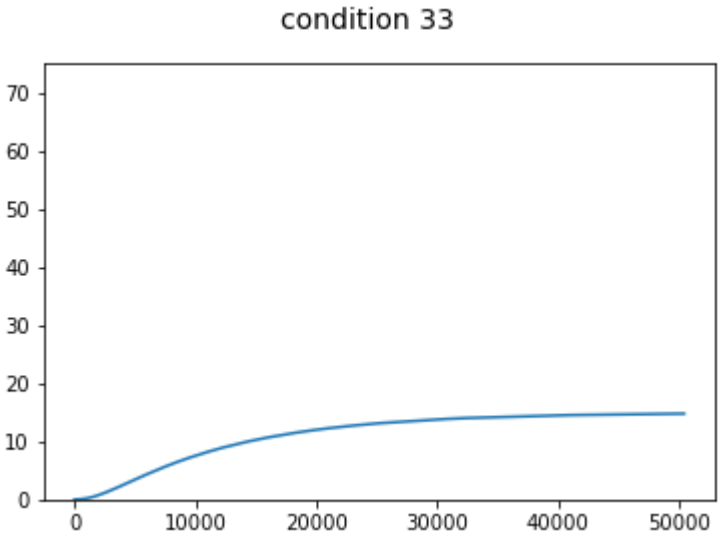
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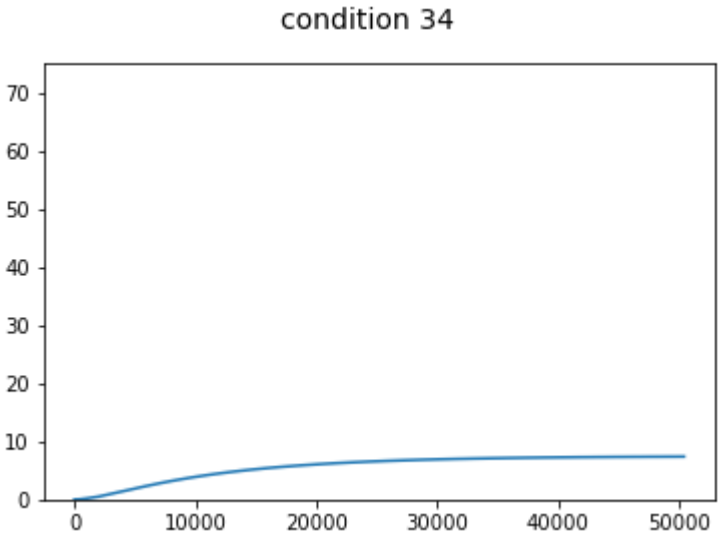
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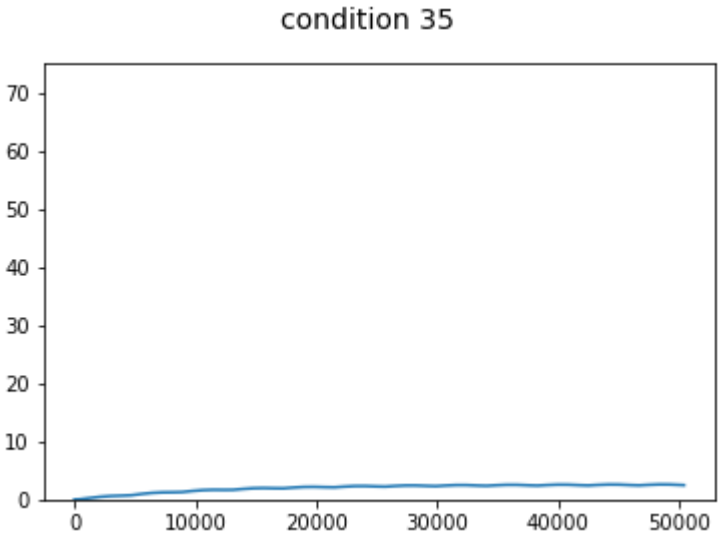
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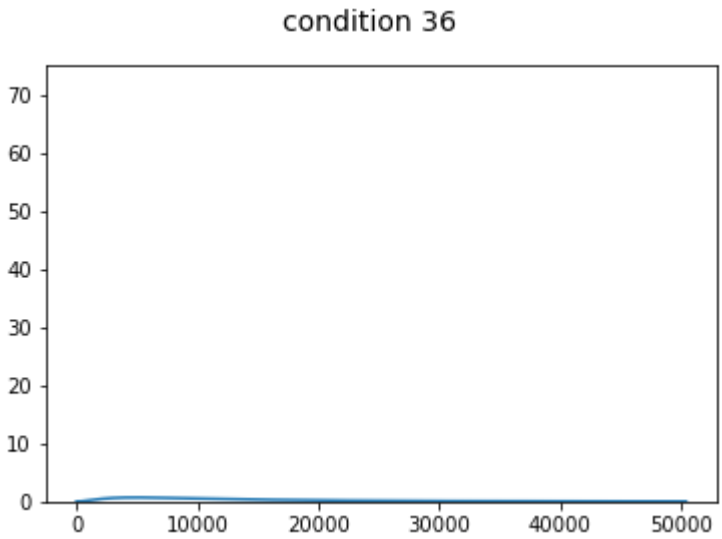
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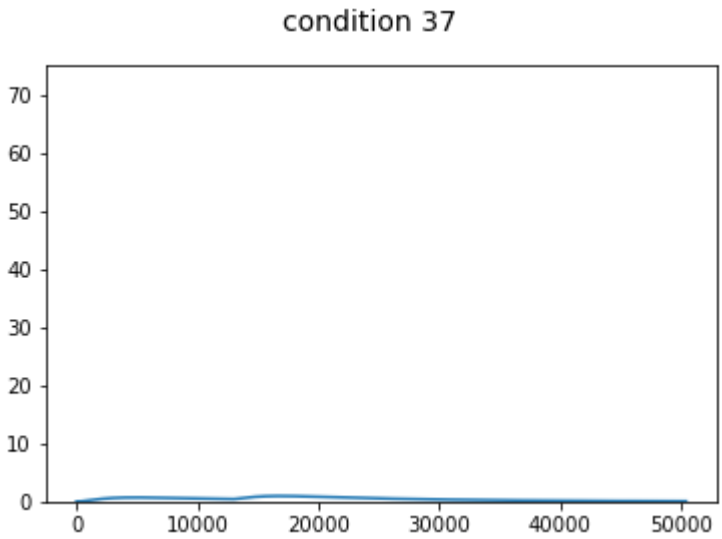
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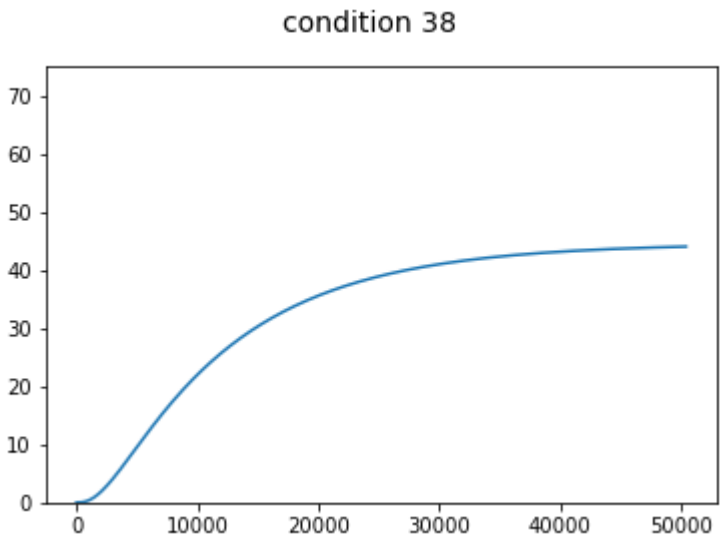
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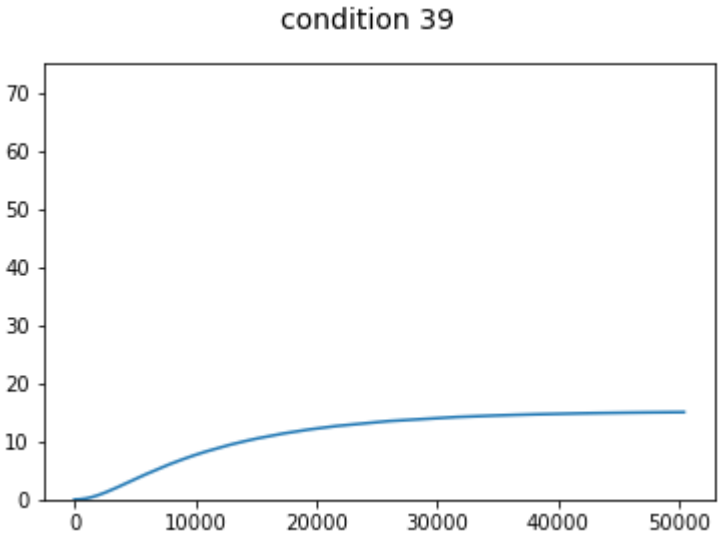
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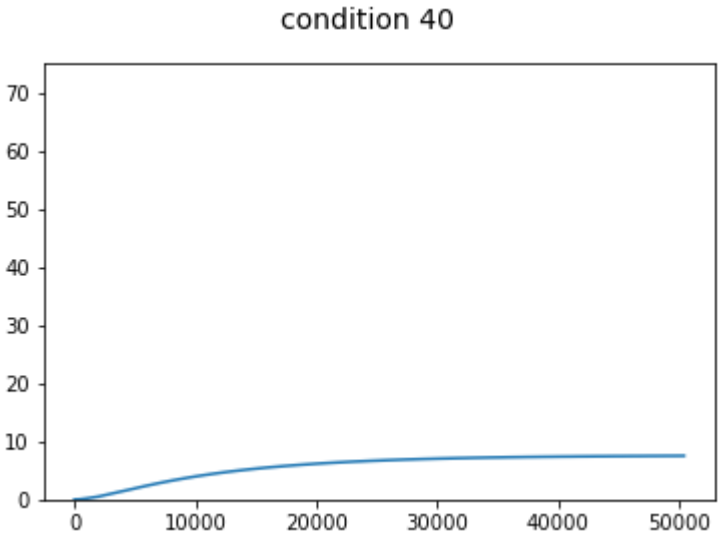
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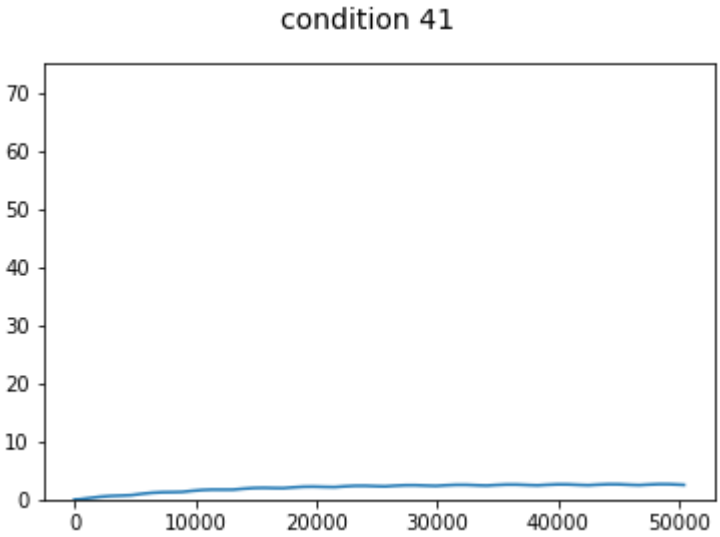
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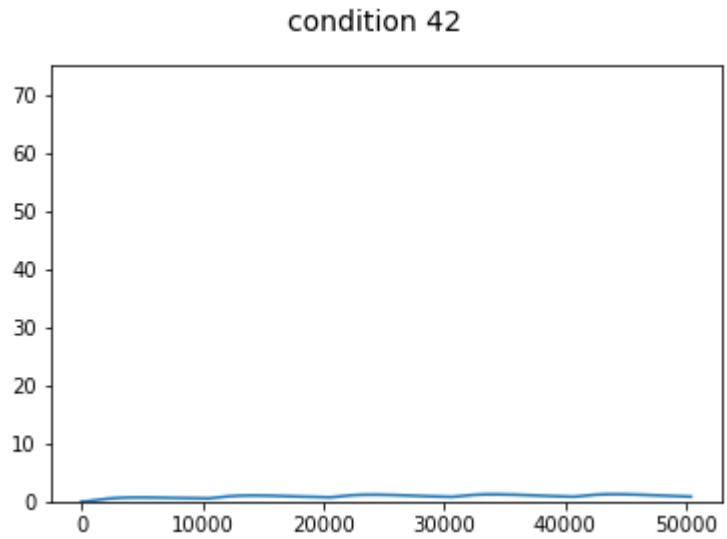
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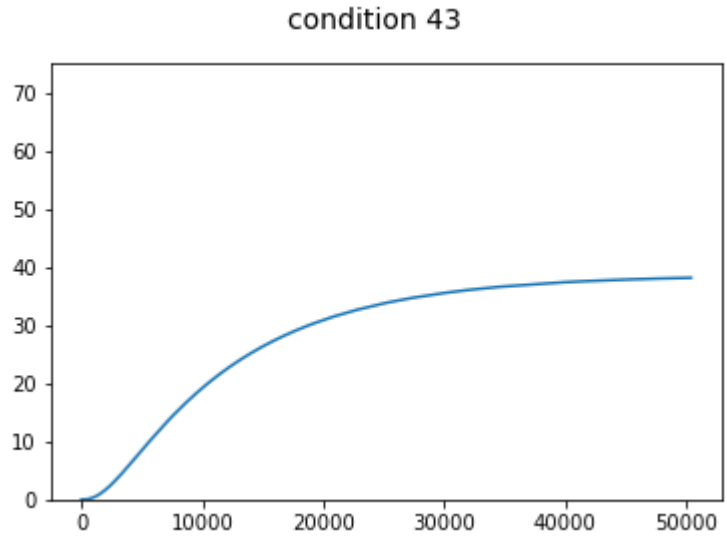
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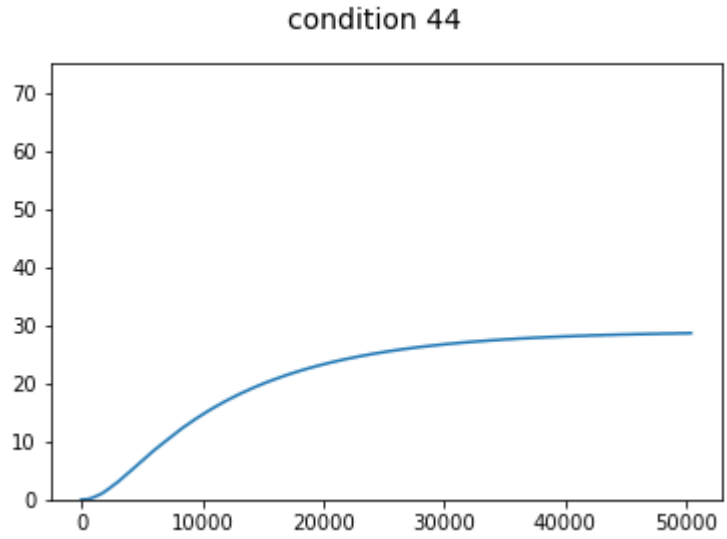
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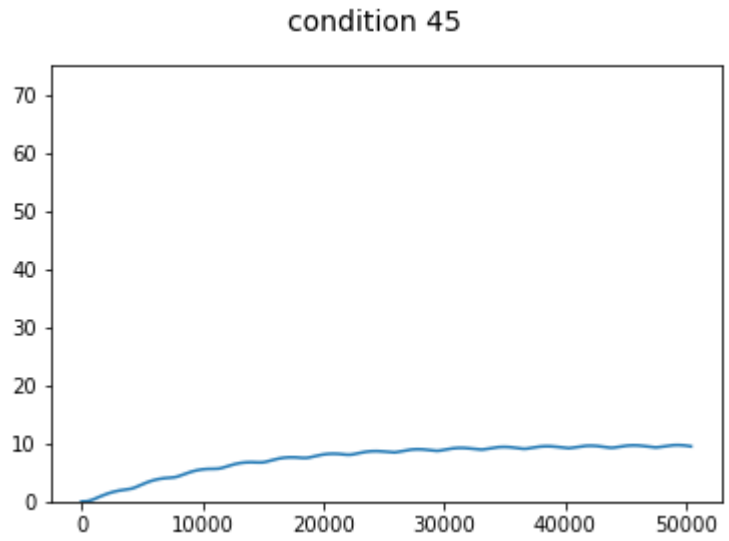
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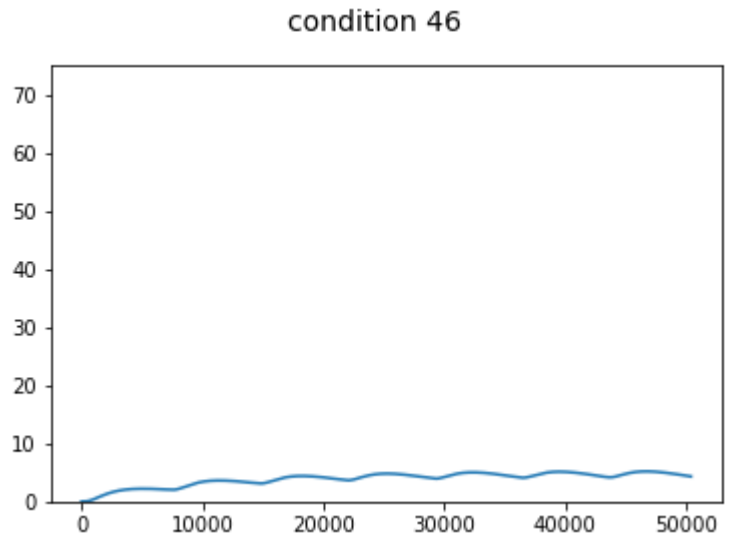
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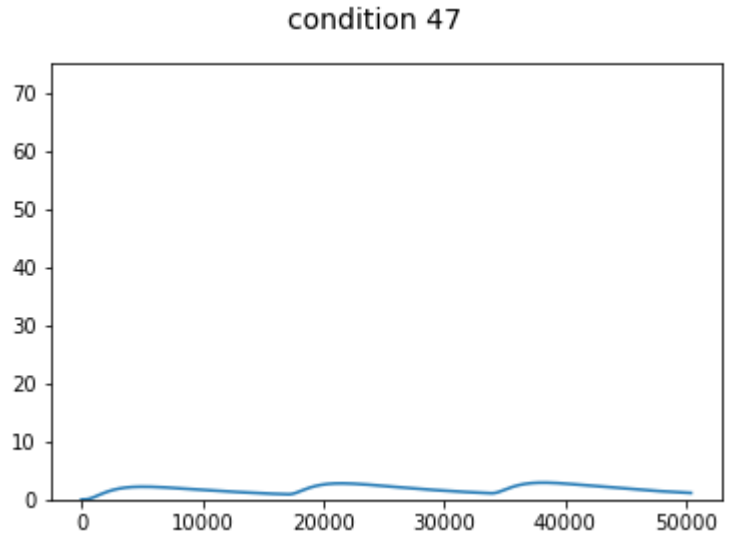
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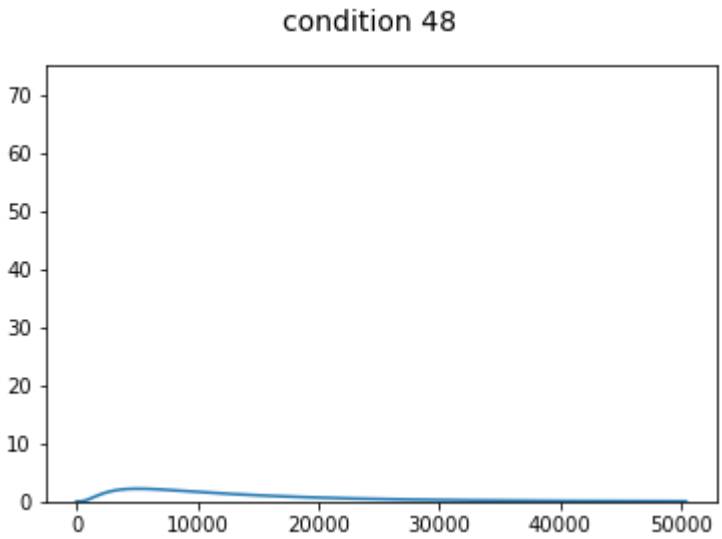
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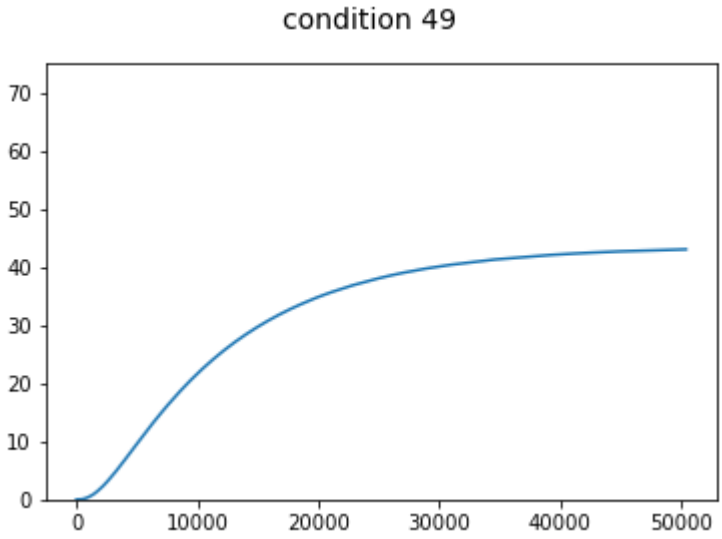
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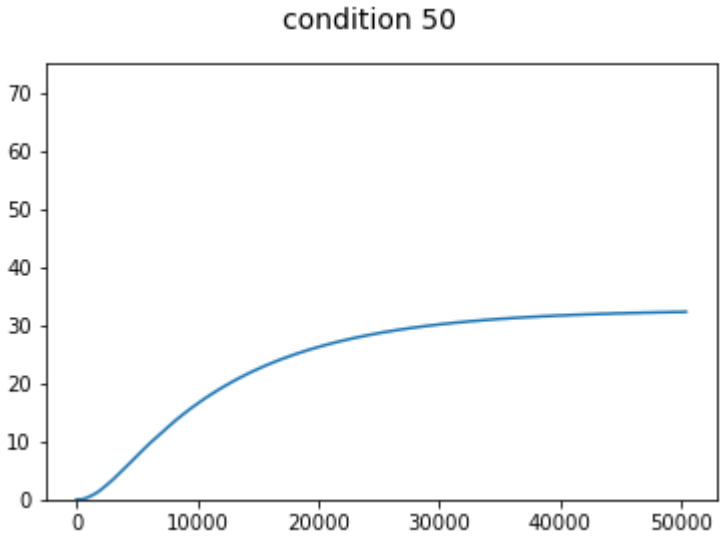
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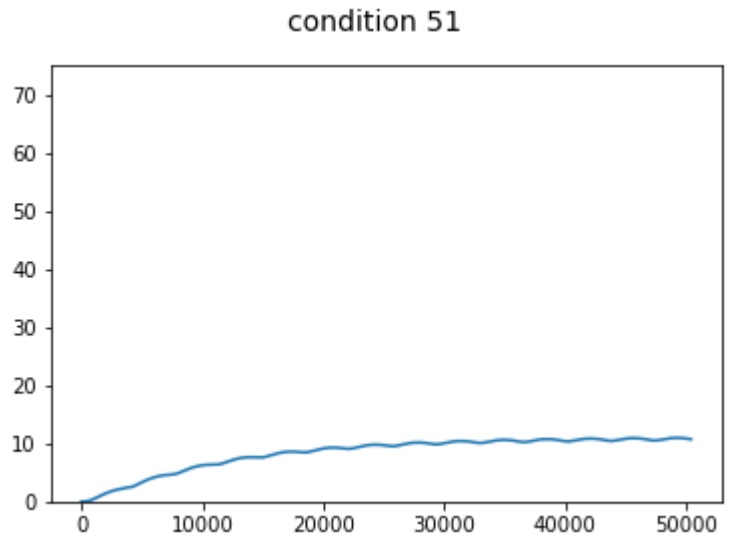
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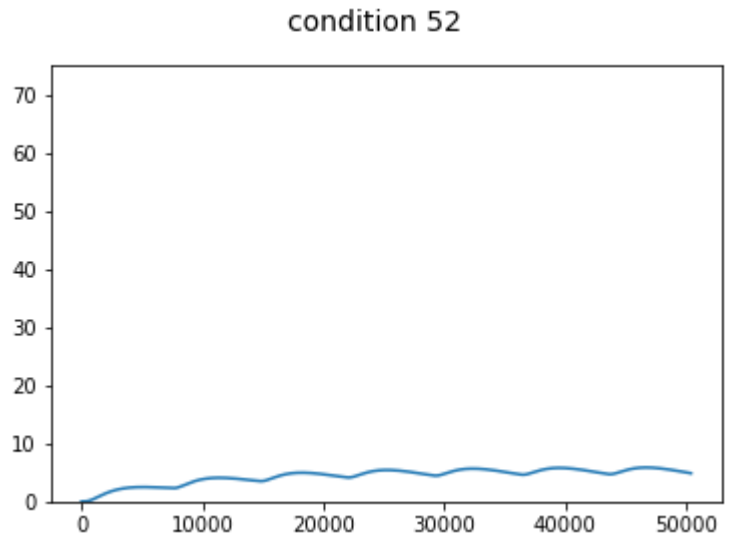
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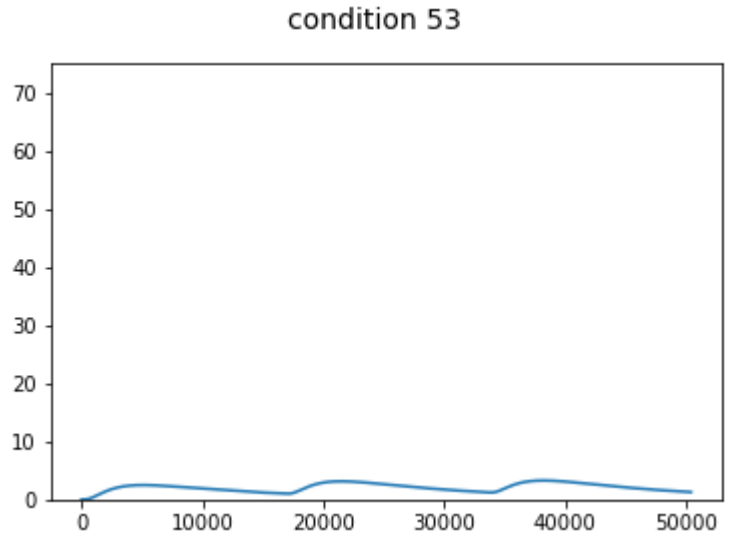
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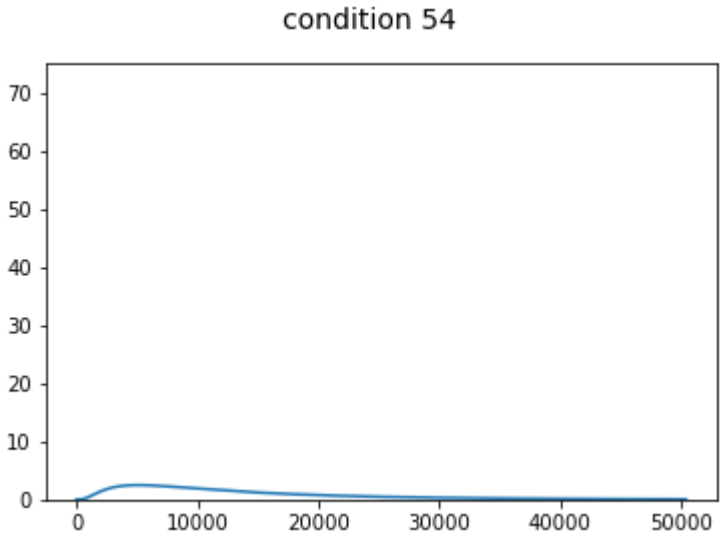
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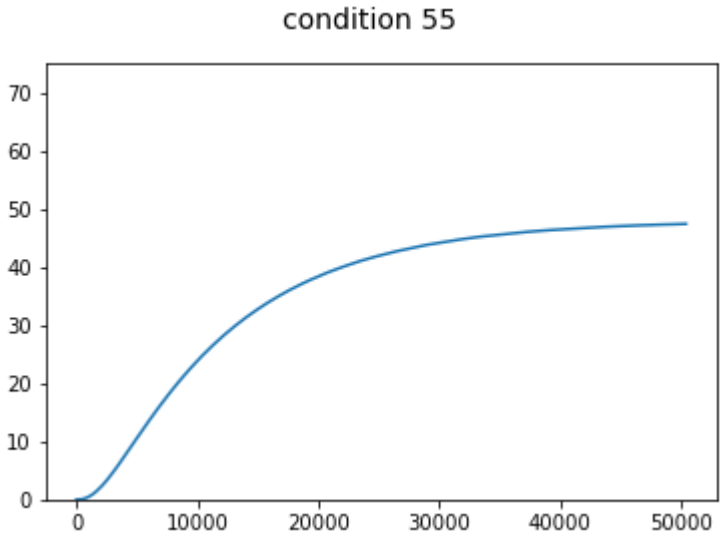
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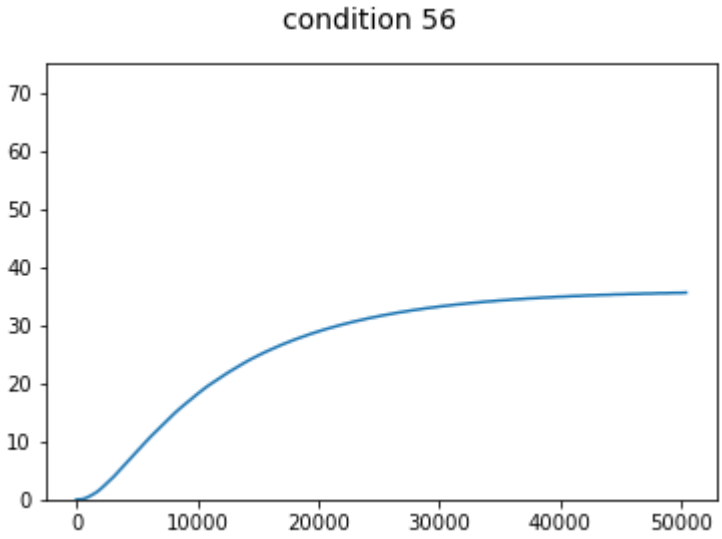
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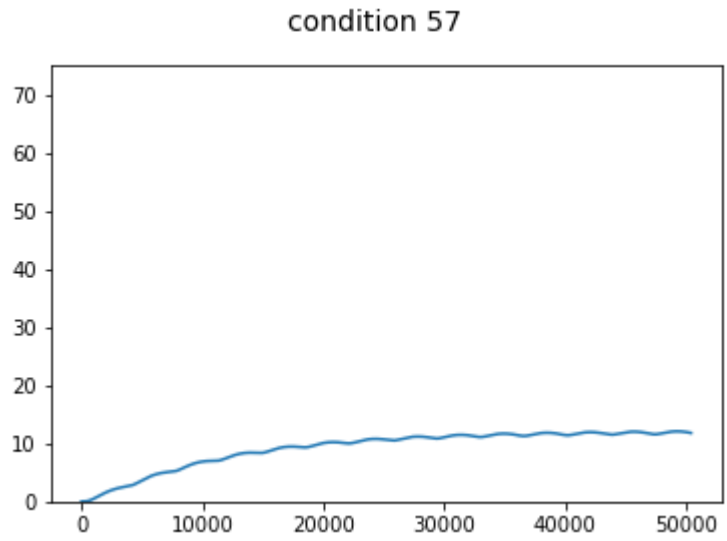
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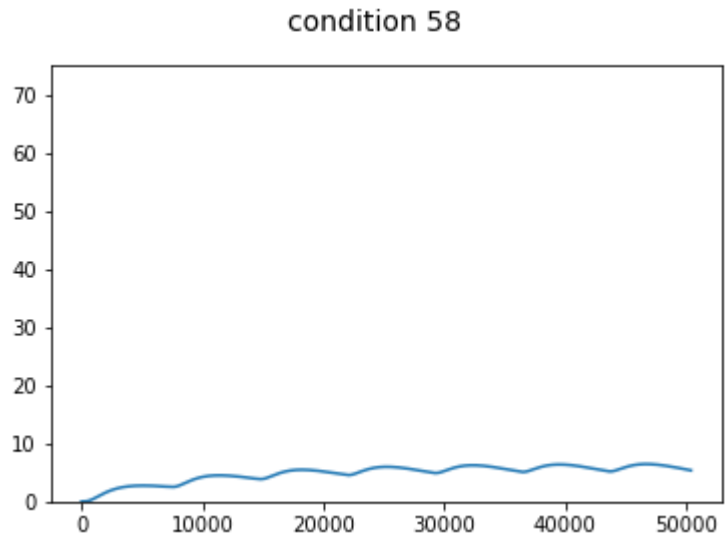
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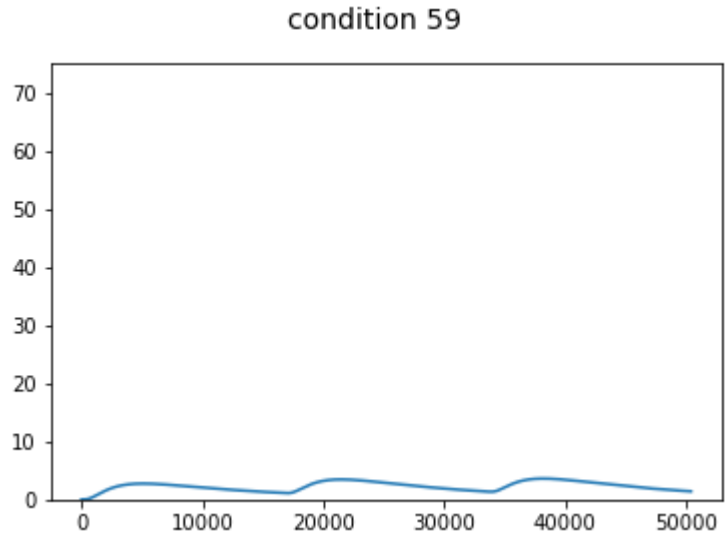
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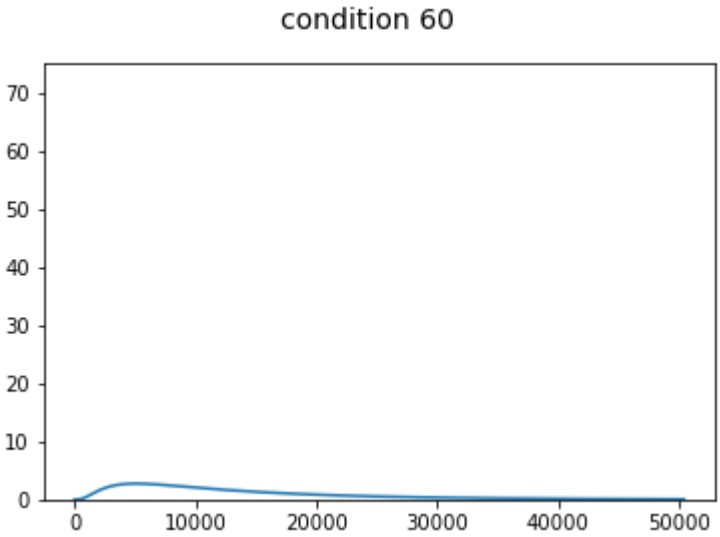
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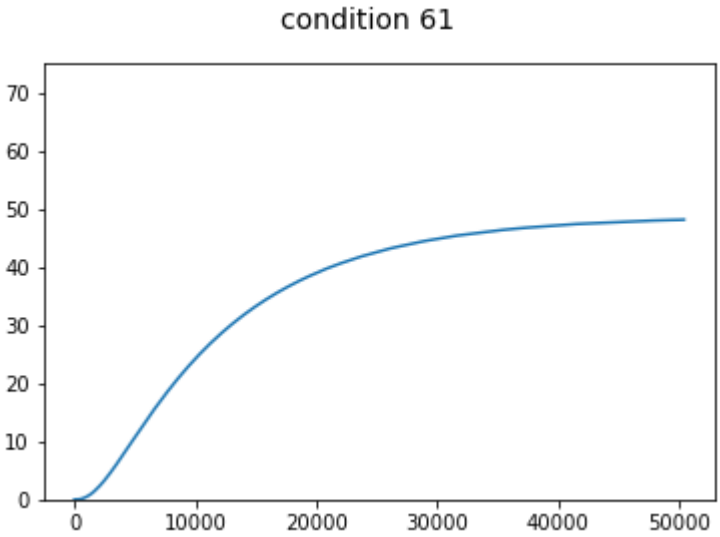
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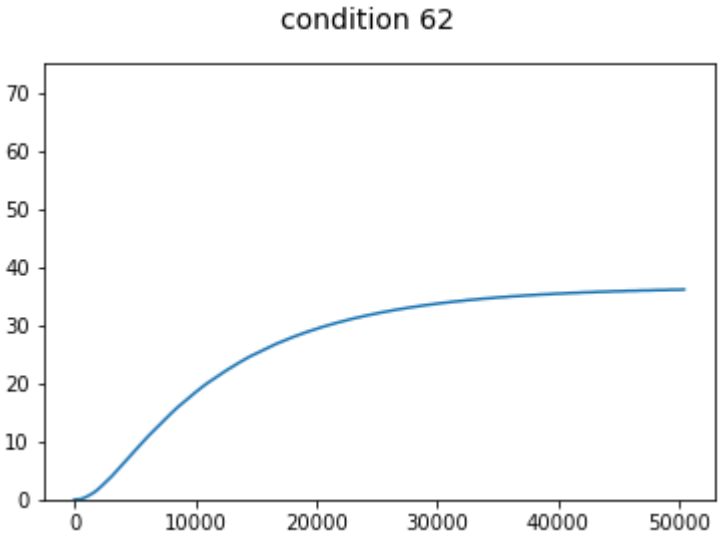
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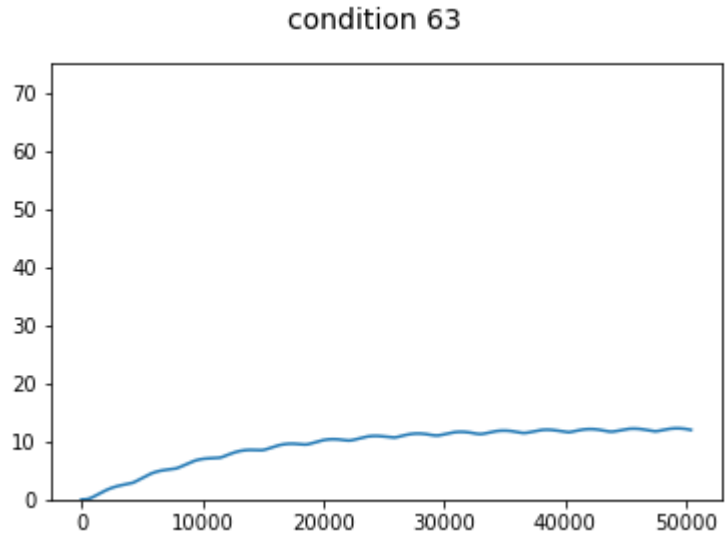
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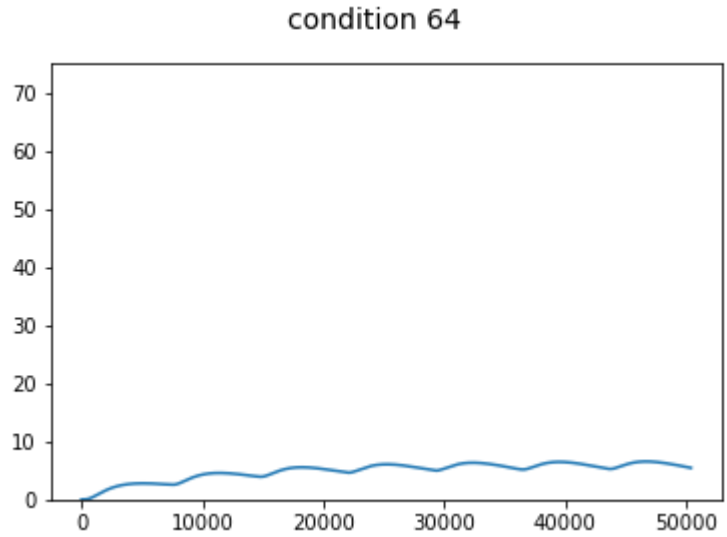
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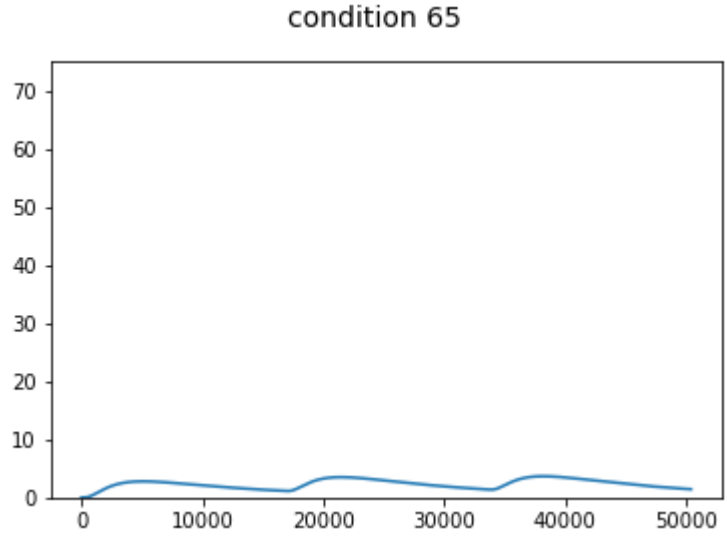
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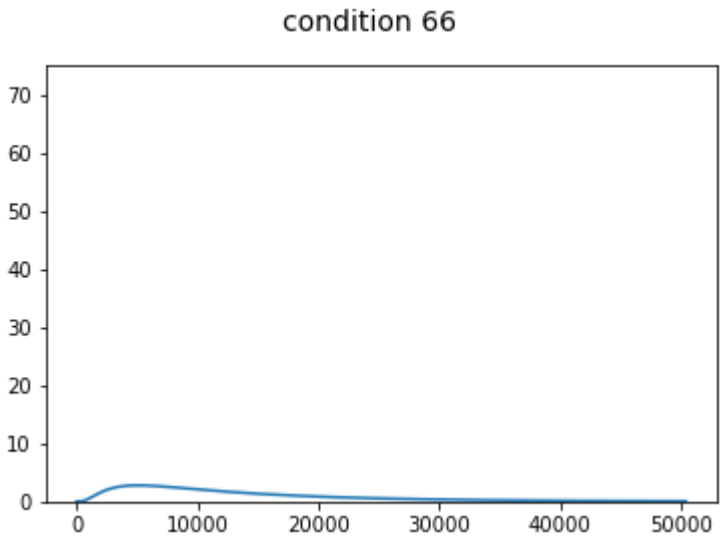
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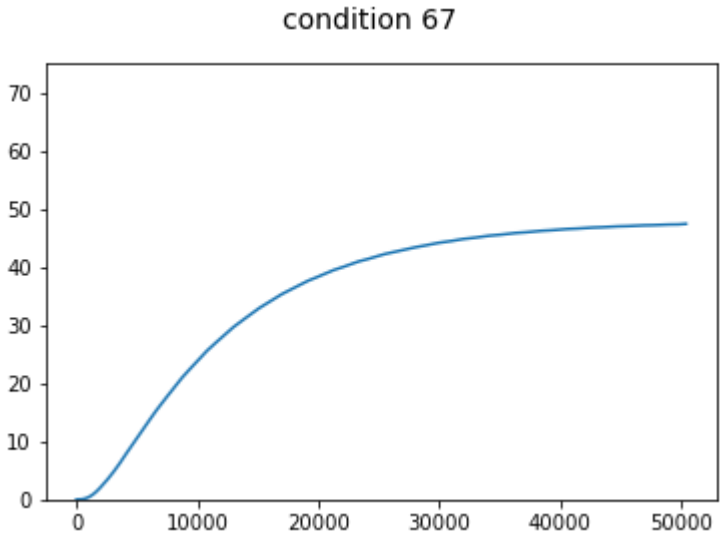
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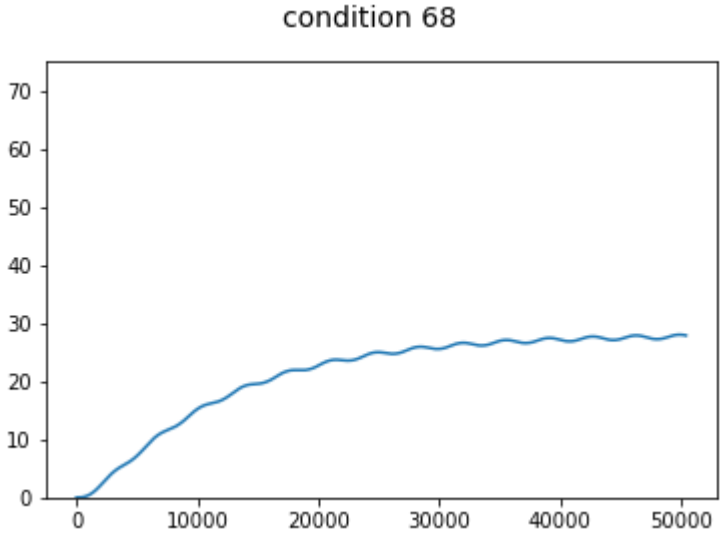
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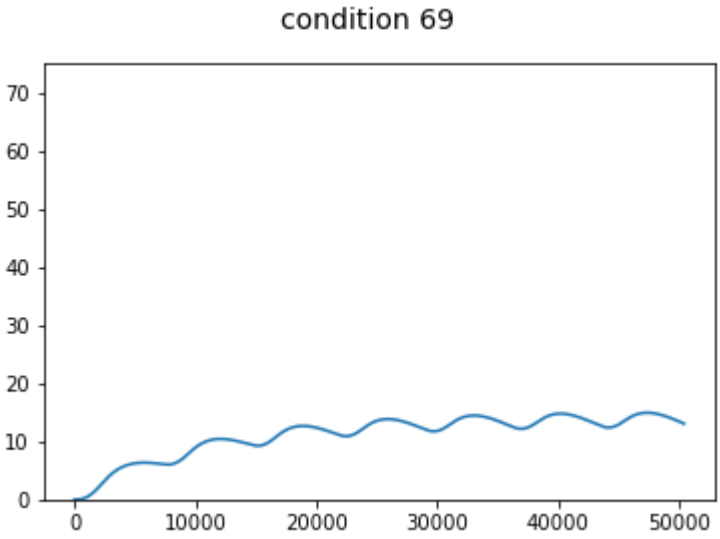
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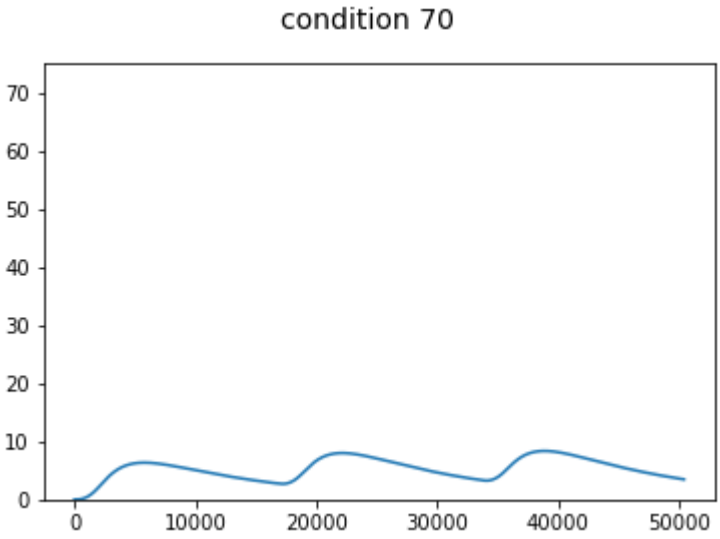
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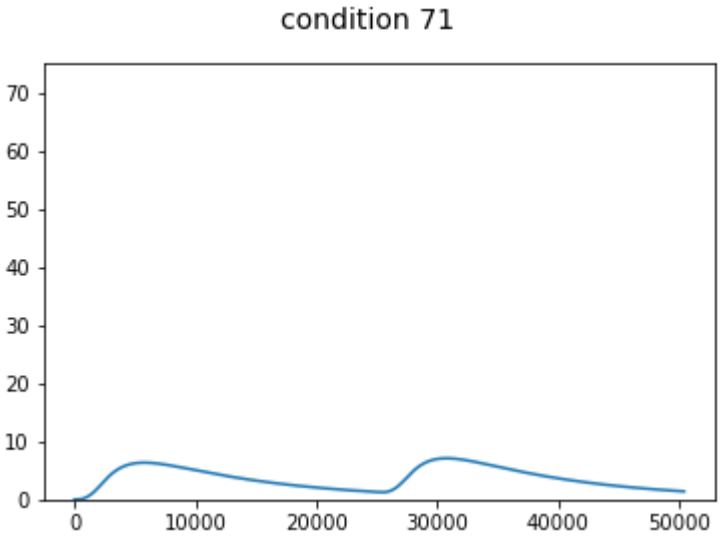
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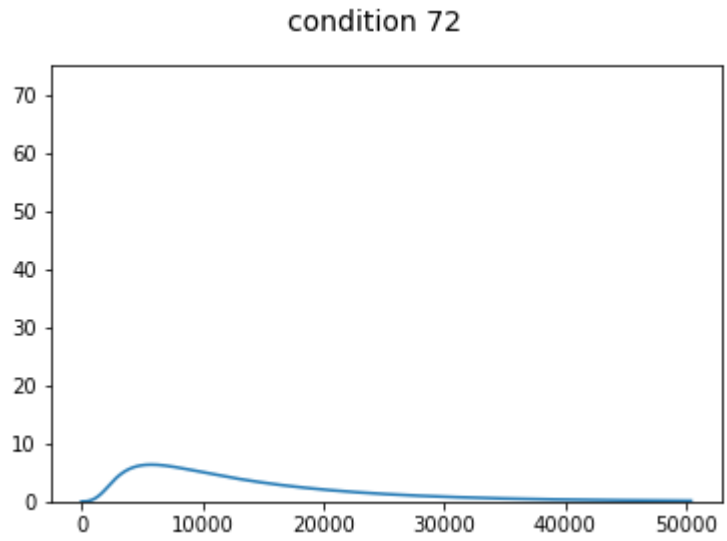
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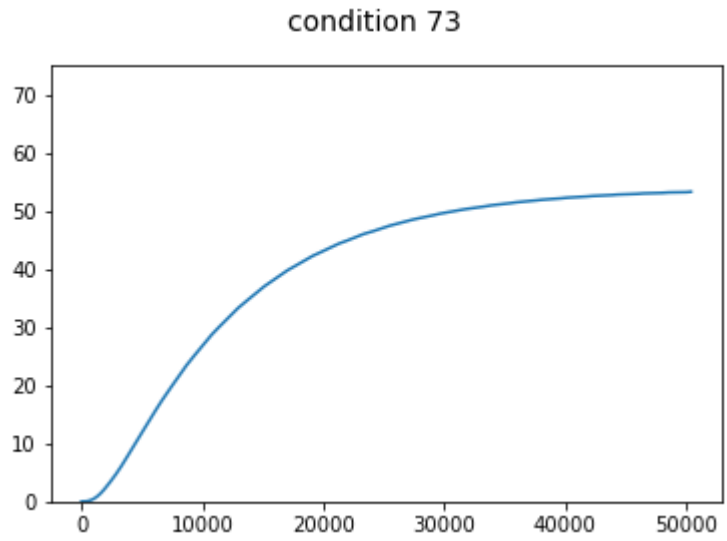
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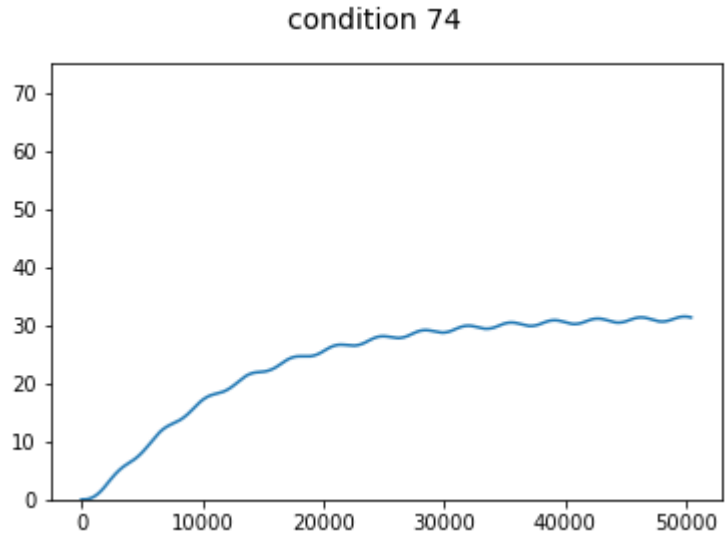
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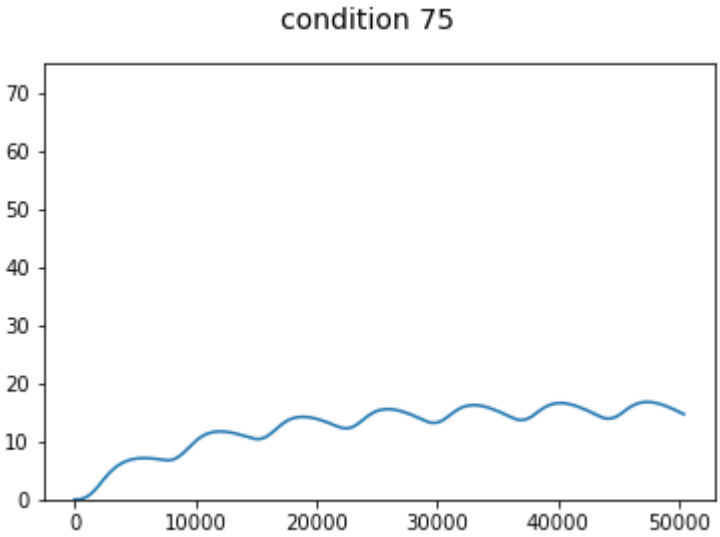
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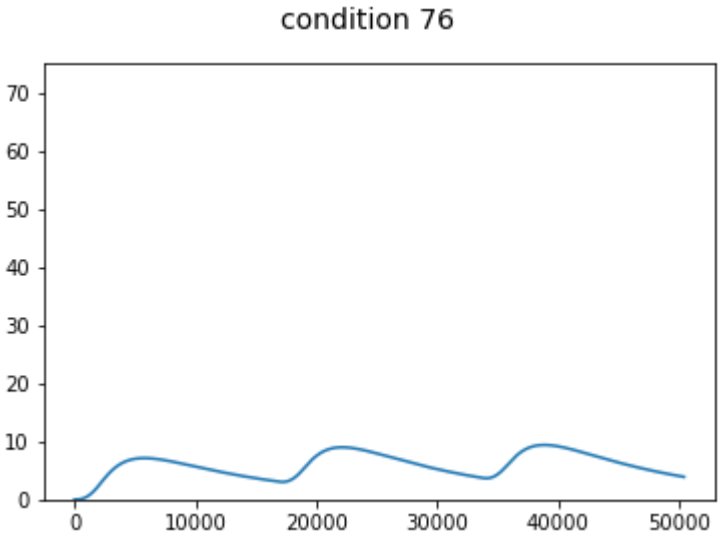
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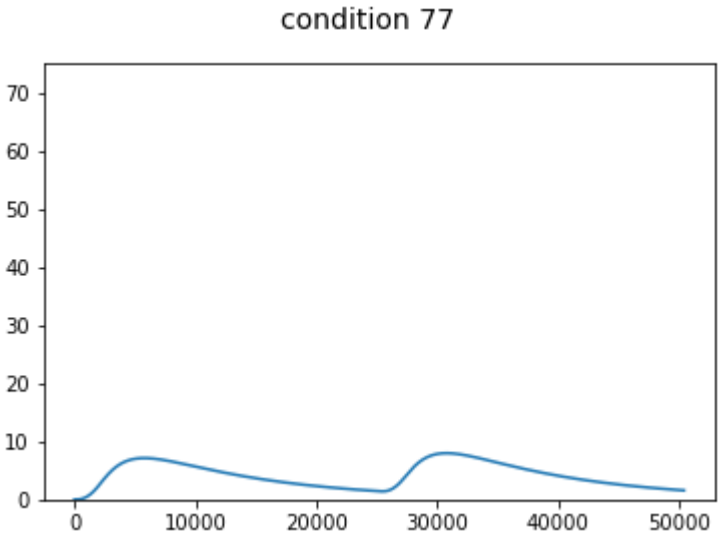
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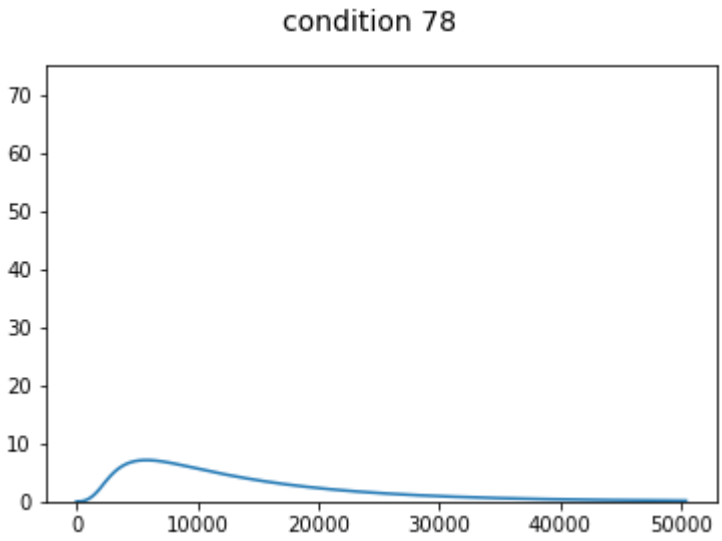
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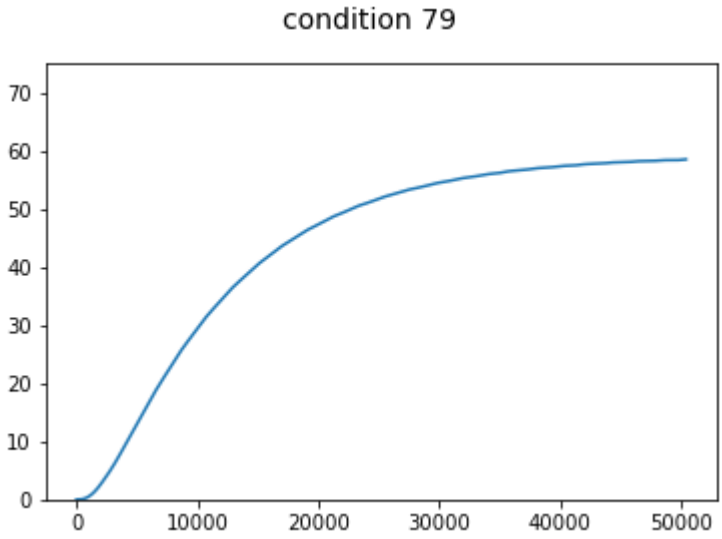
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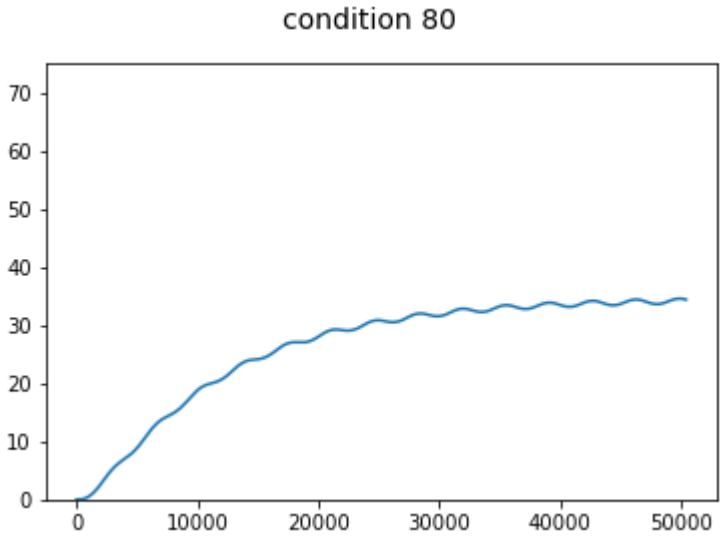
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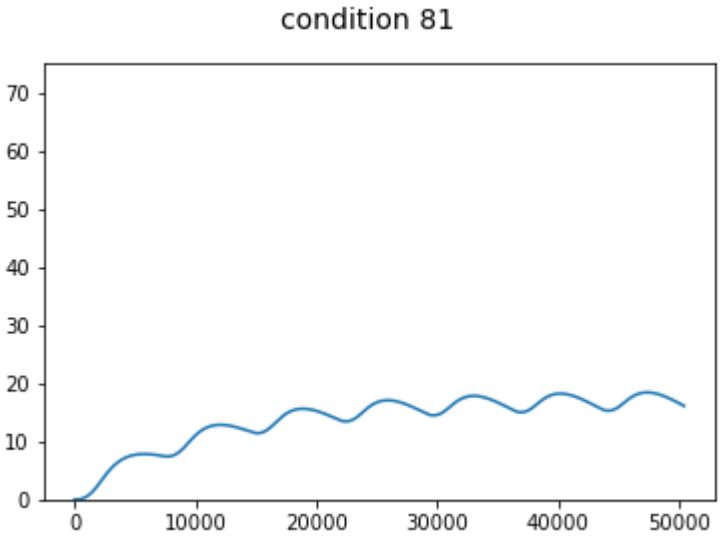
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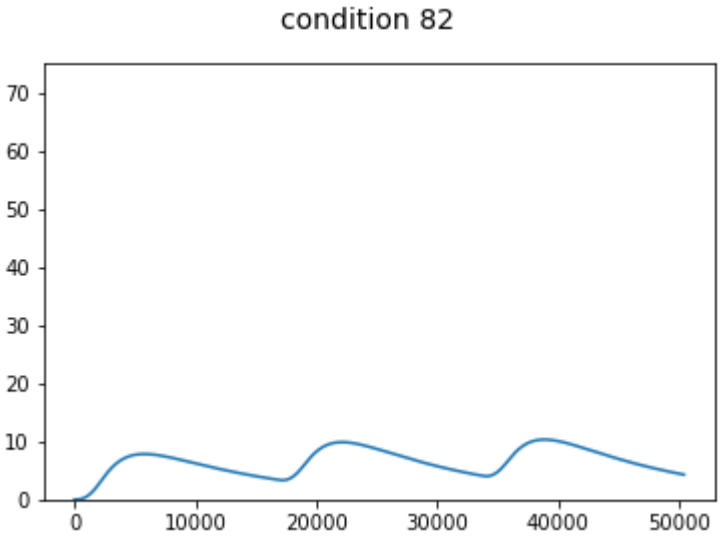
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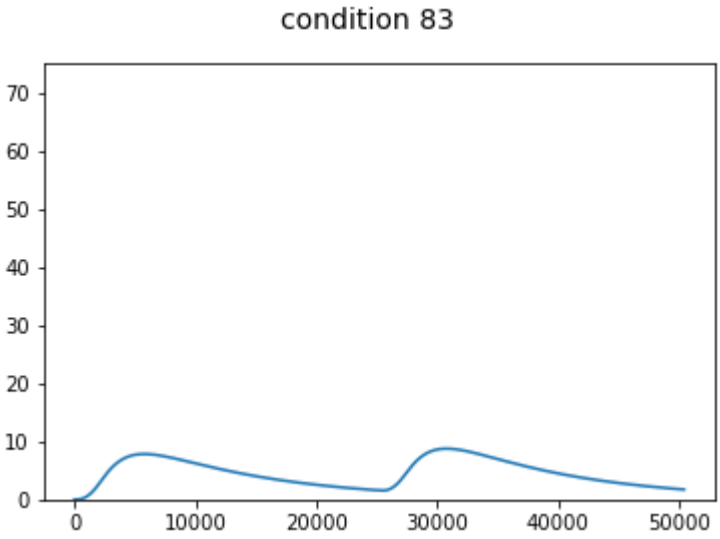
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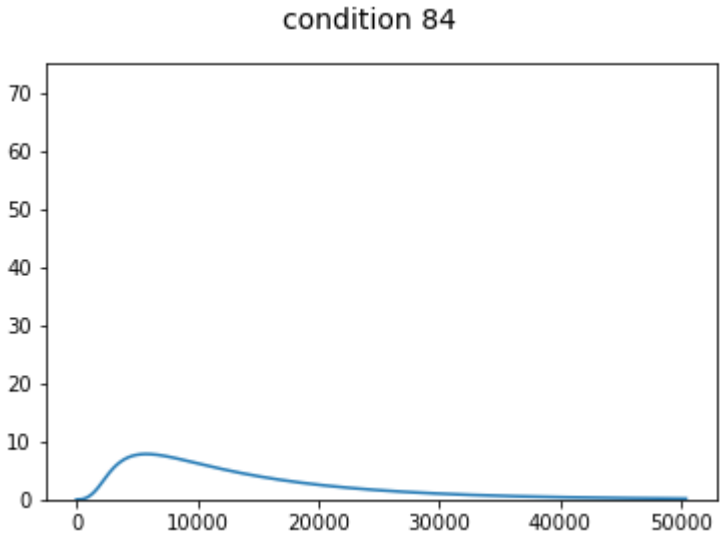
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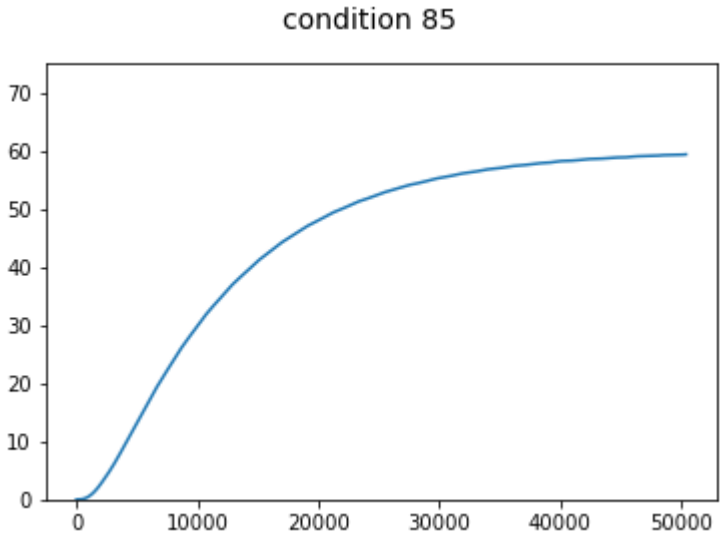
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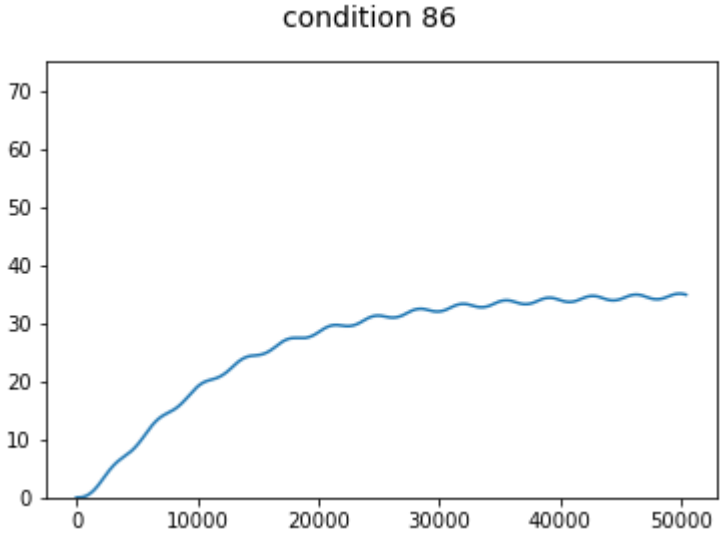
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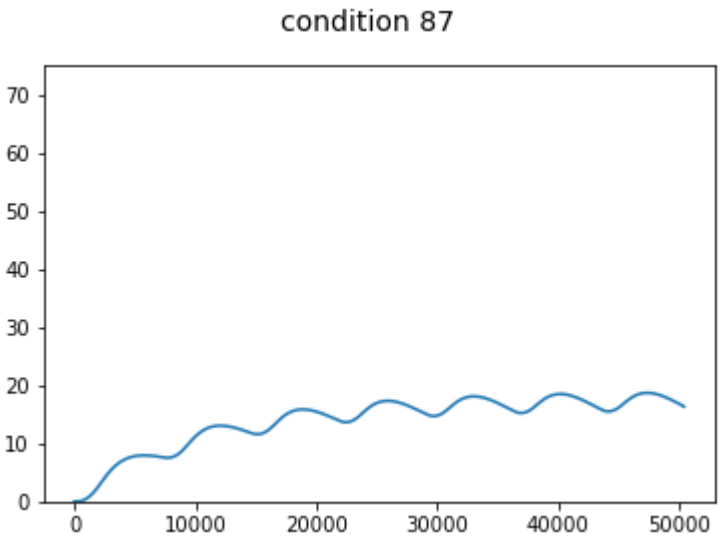
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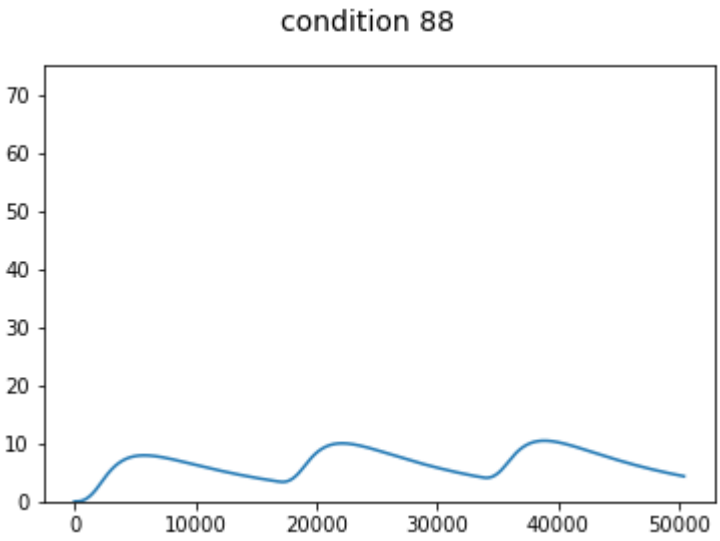
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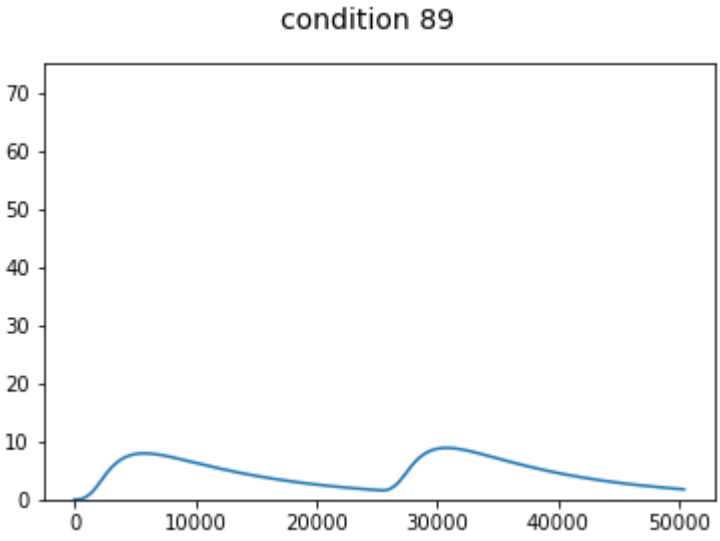
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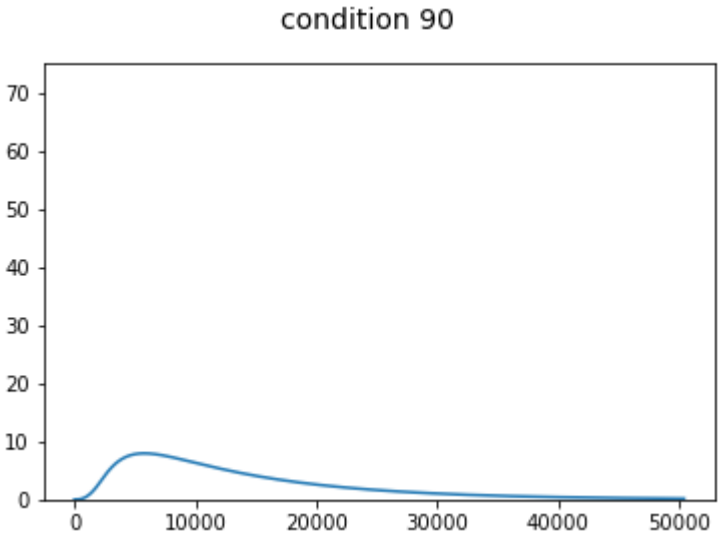
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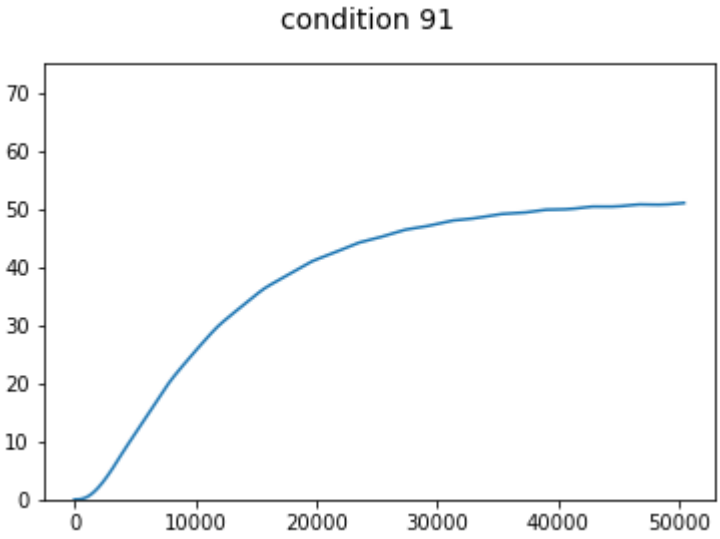
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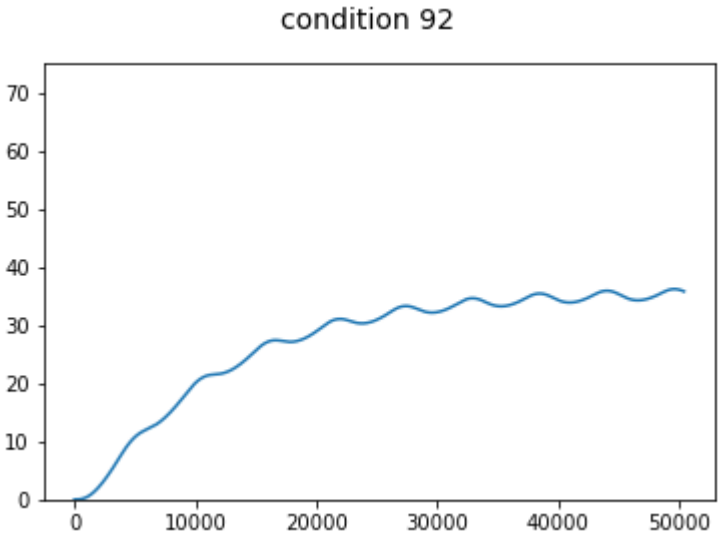
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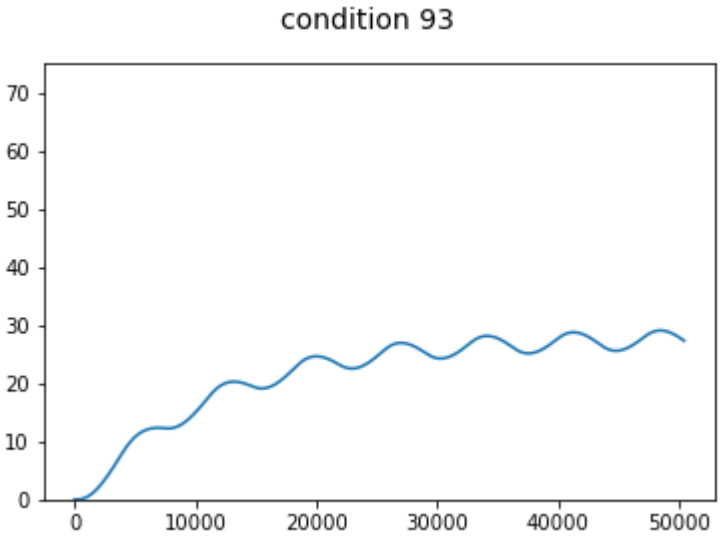
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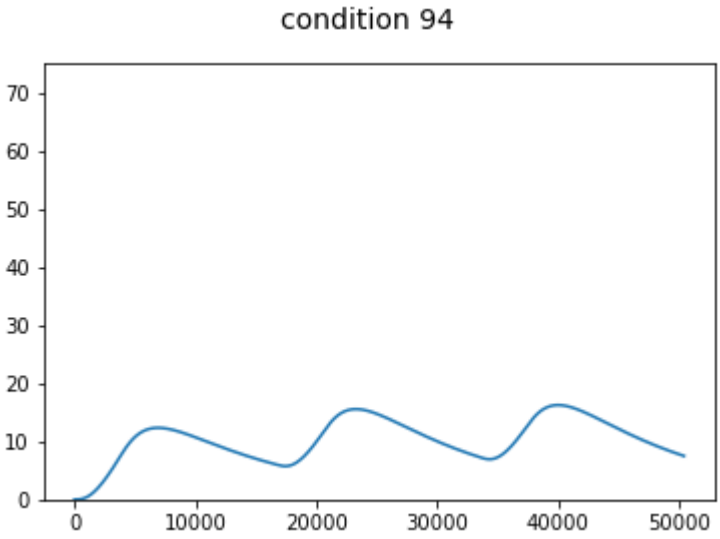
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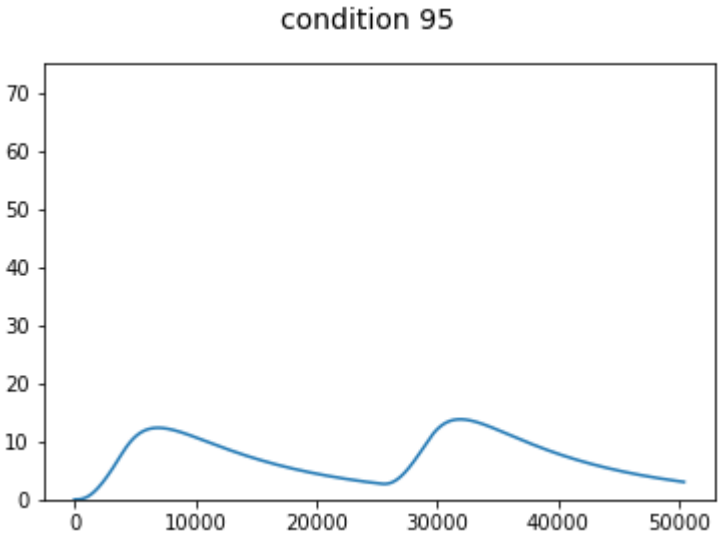
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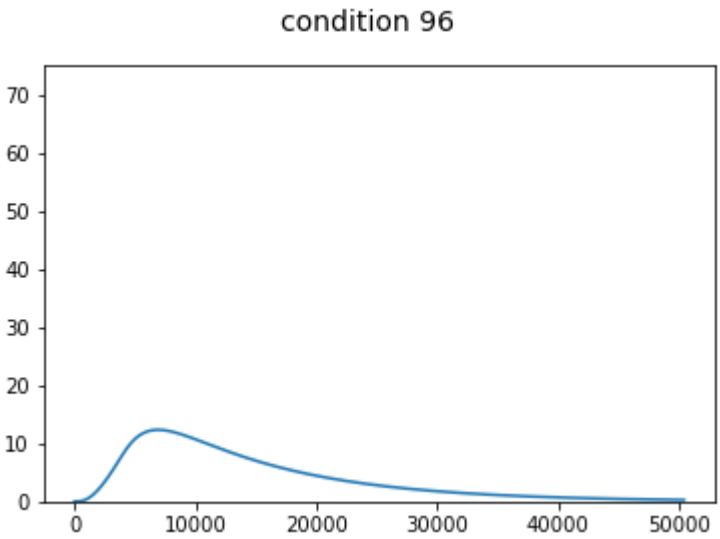
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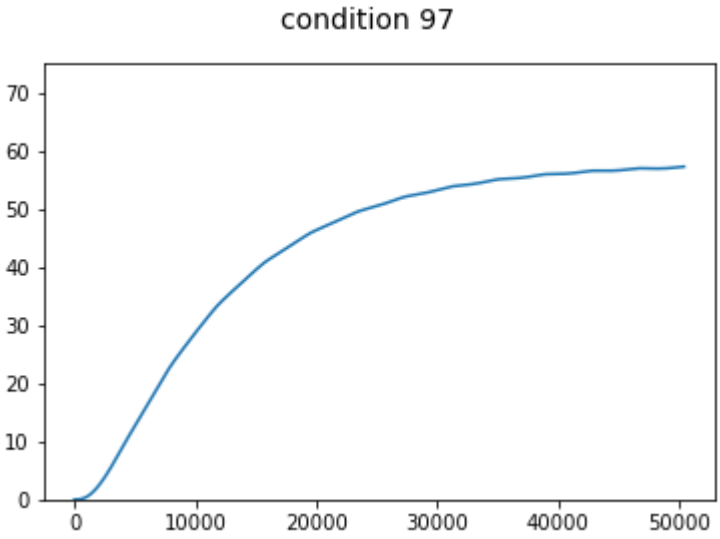
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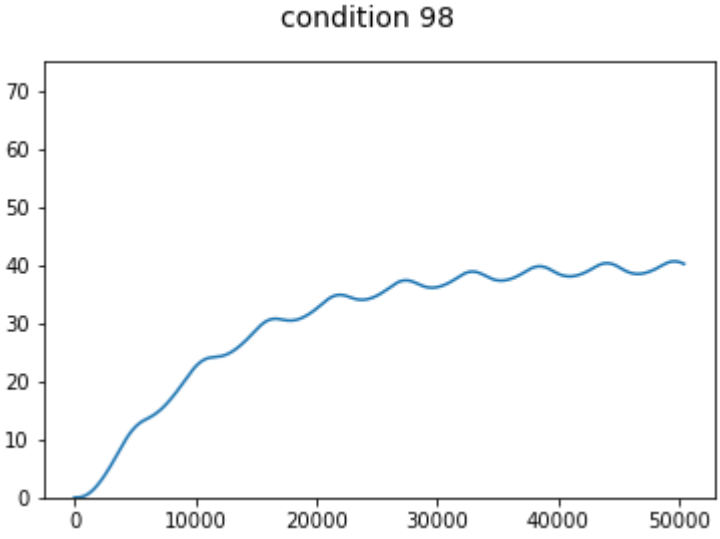
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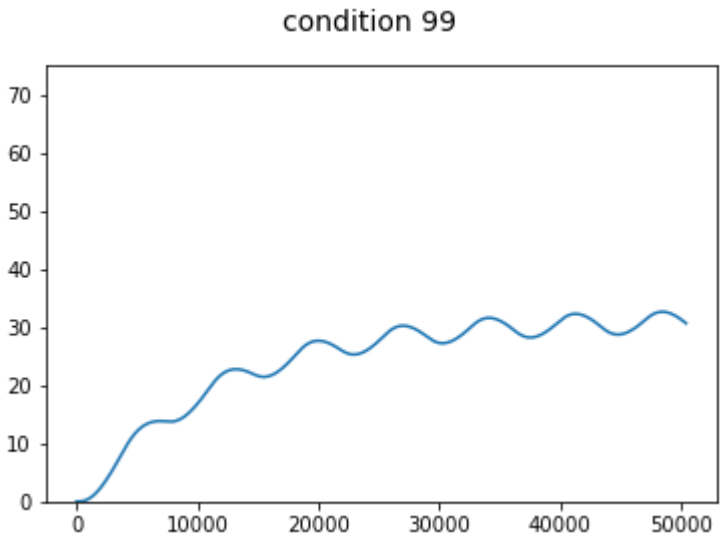
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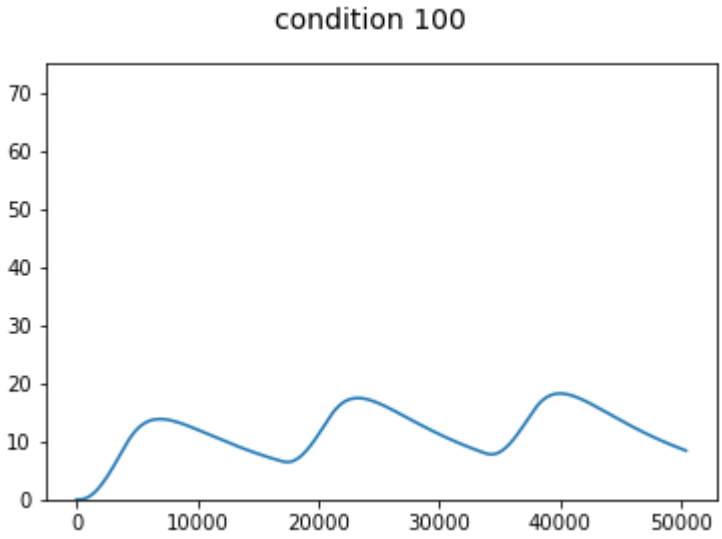
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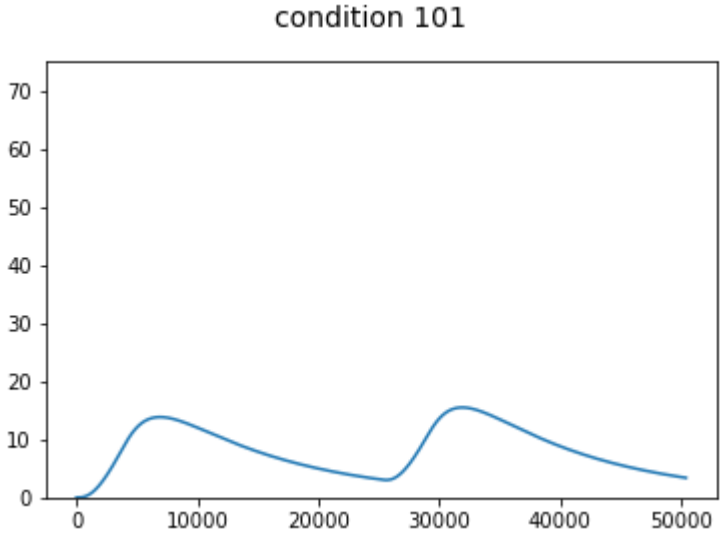
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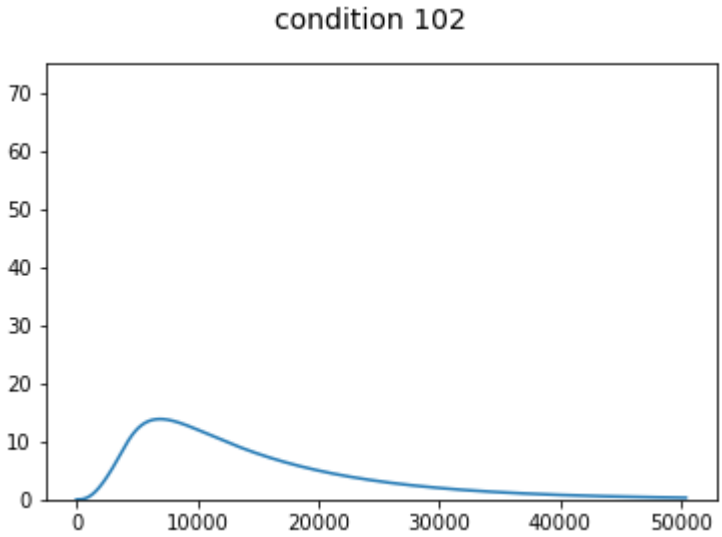
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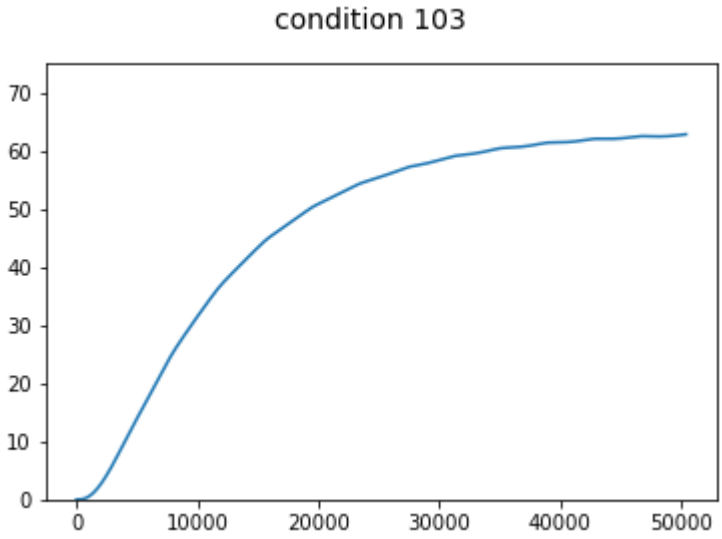
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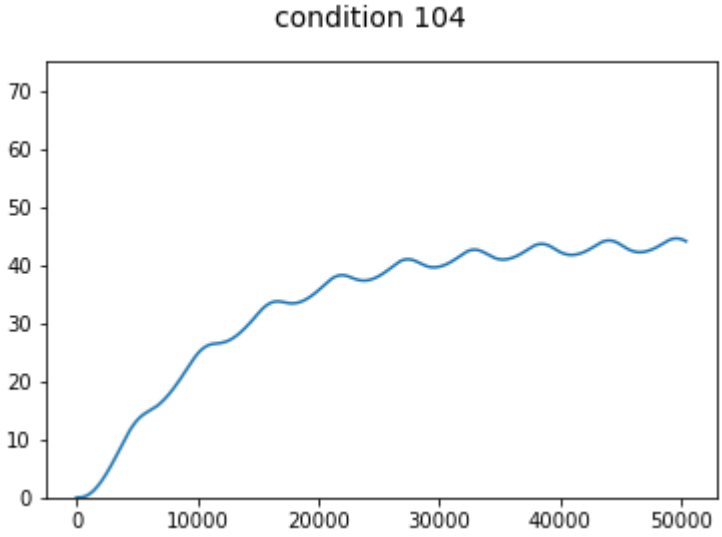
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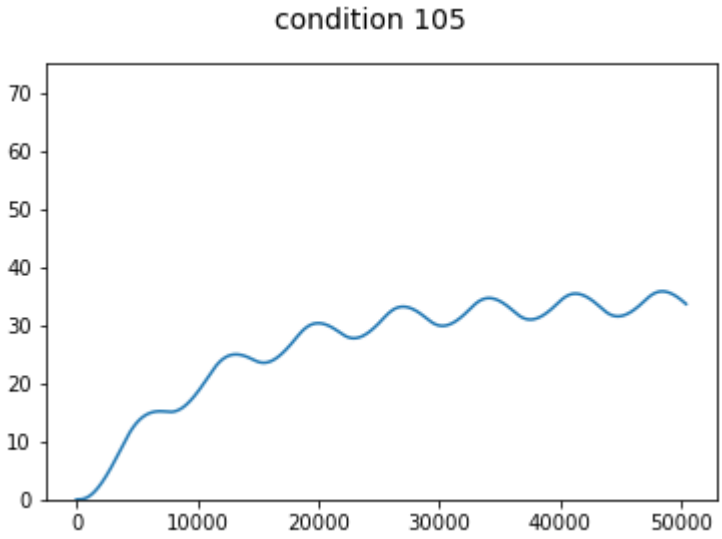
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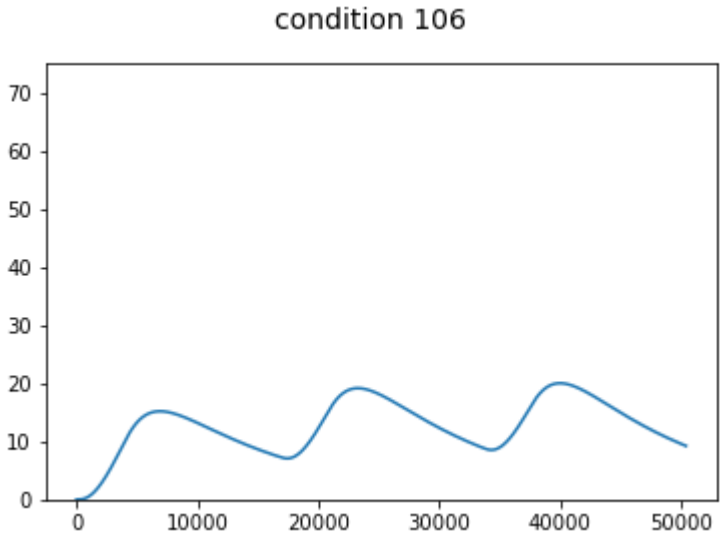
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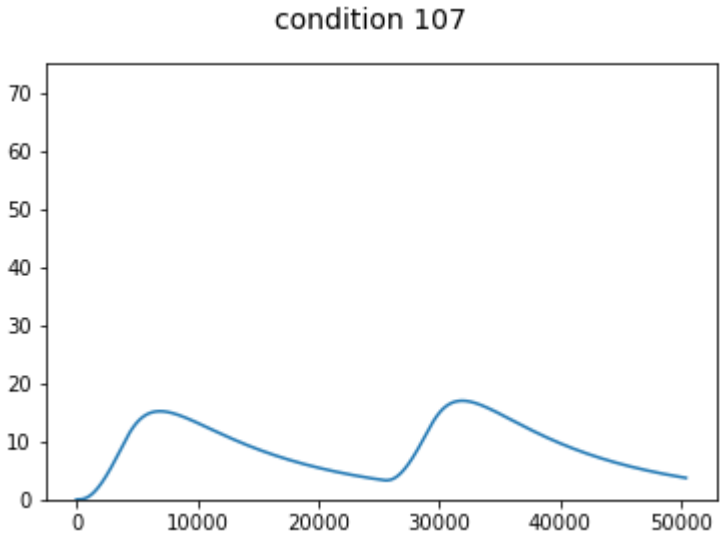
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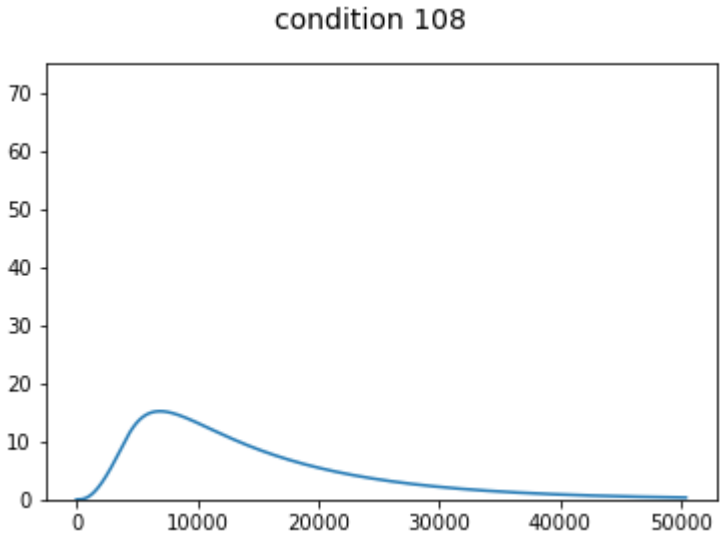
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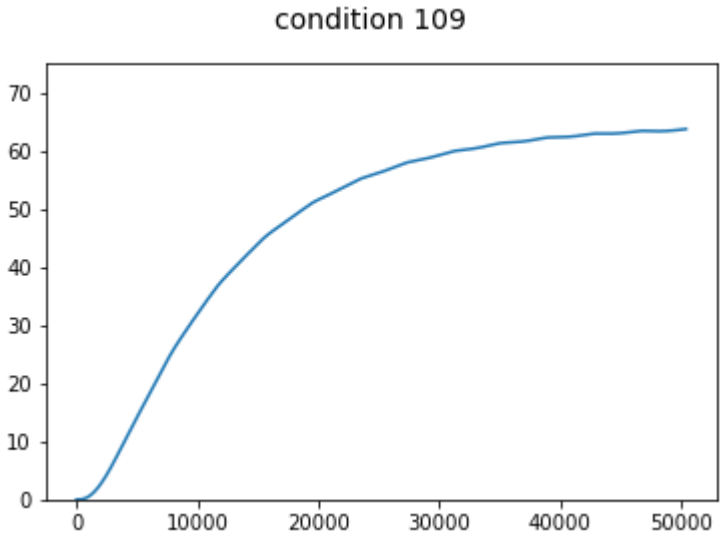
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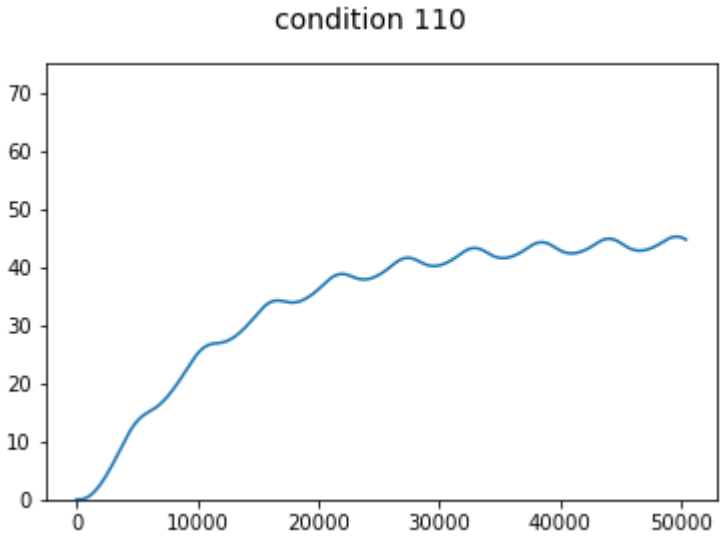
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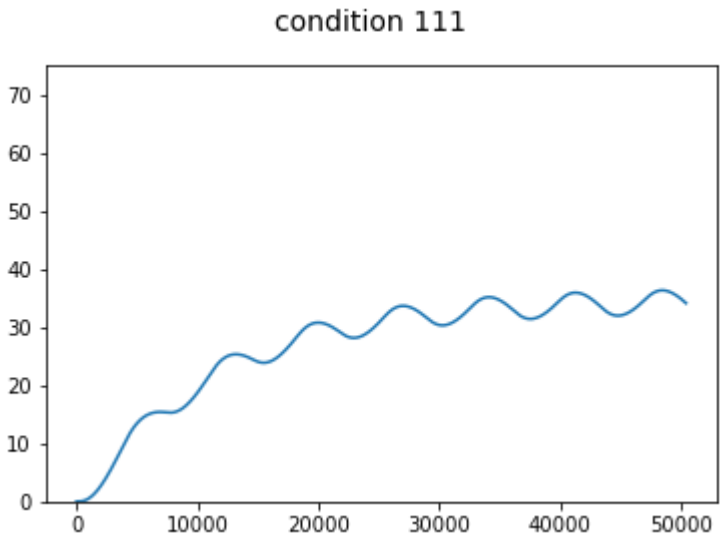
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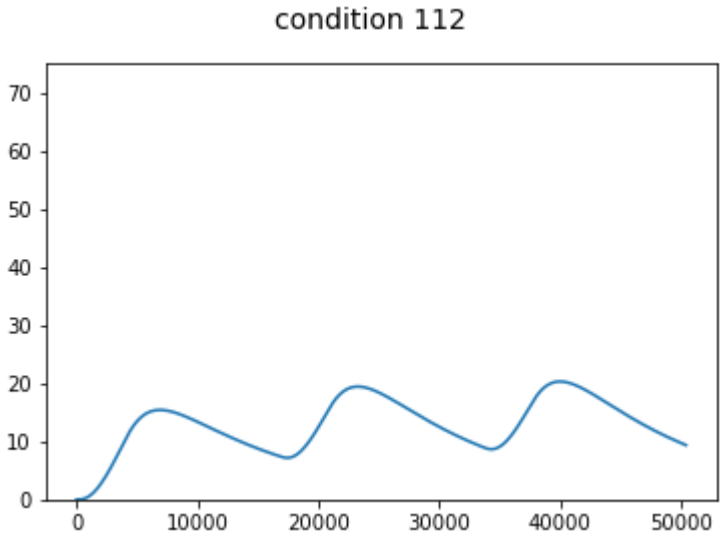
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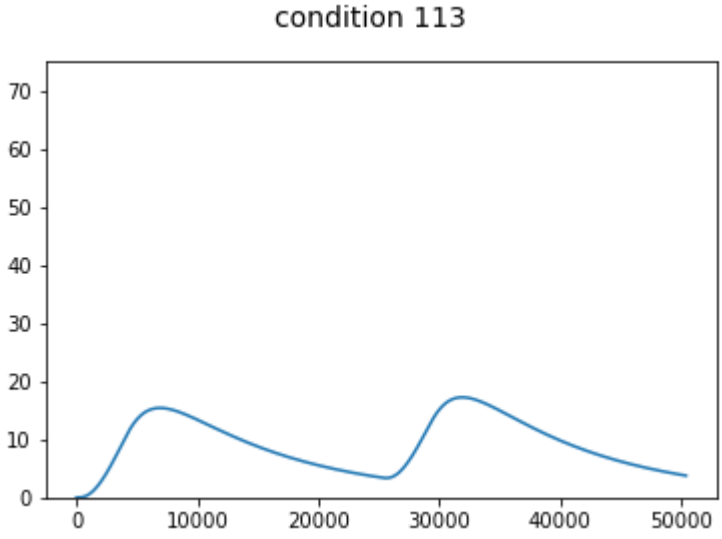
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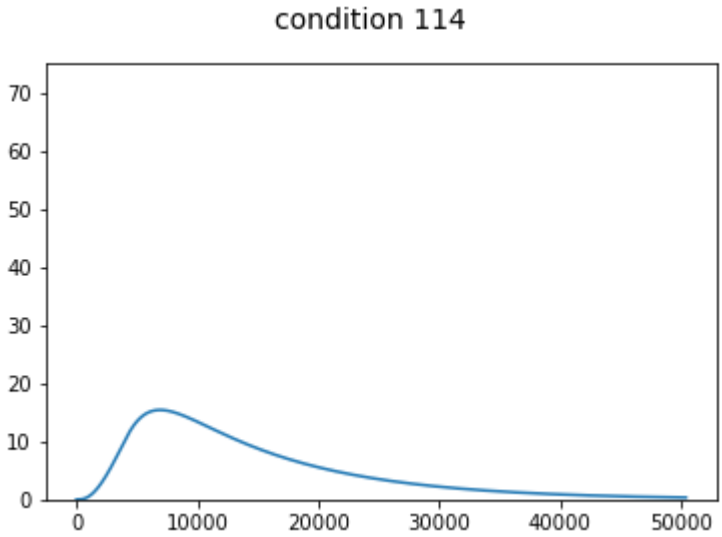
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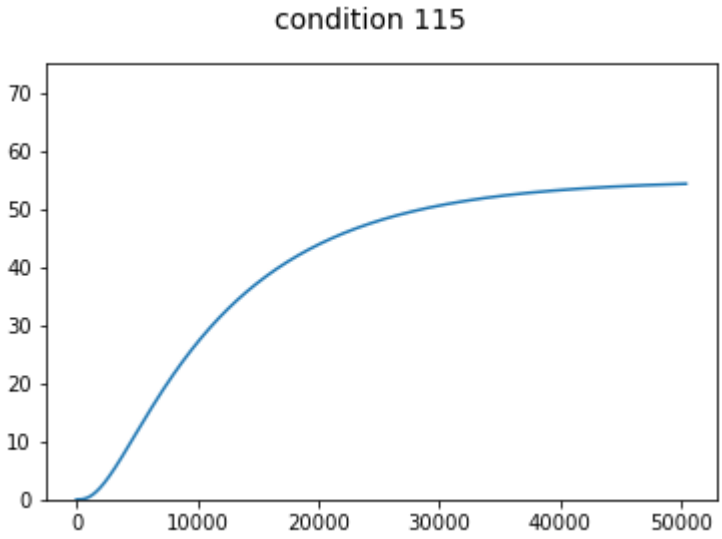
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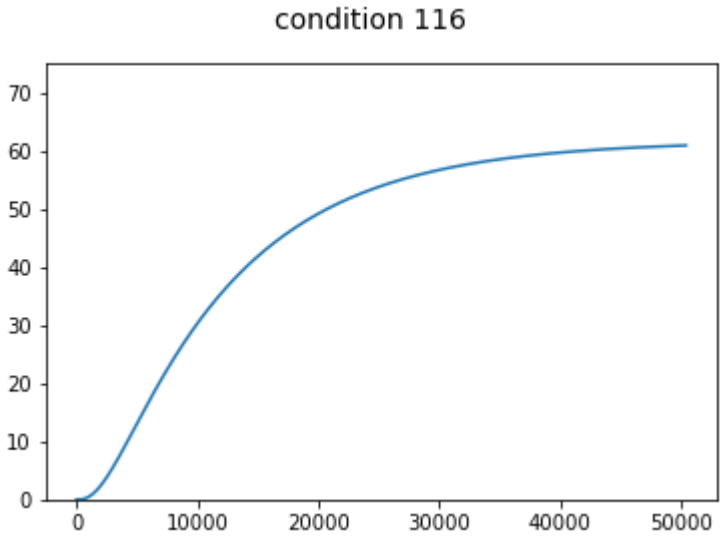
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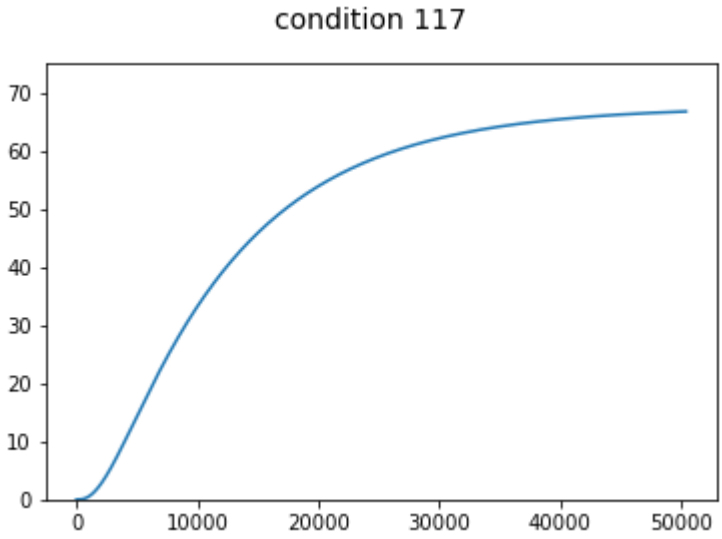
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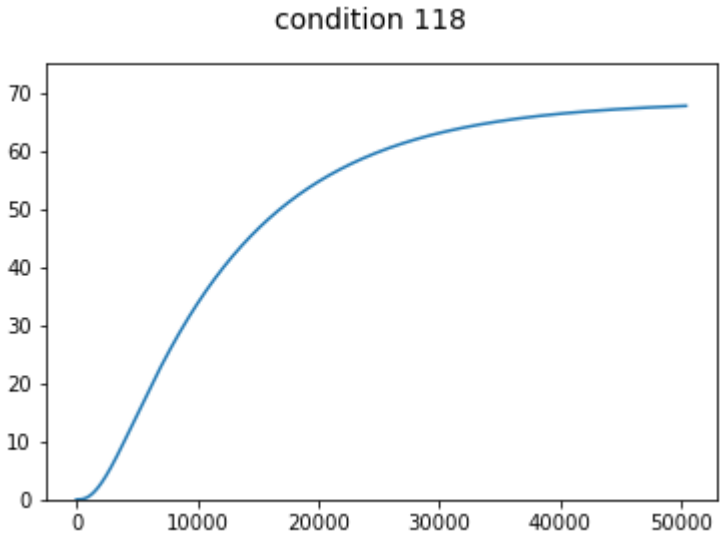
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