File: e:\courses\spring2006\434\hop_ex1.doc RWN 03/02/06

The Hopfield neural network set up in class works well if the resistors are expressed as decimals rather than fractions - for some reason PSpice does not appear to accept rational fractions. So the decimal form is given below with the transient analysis results.

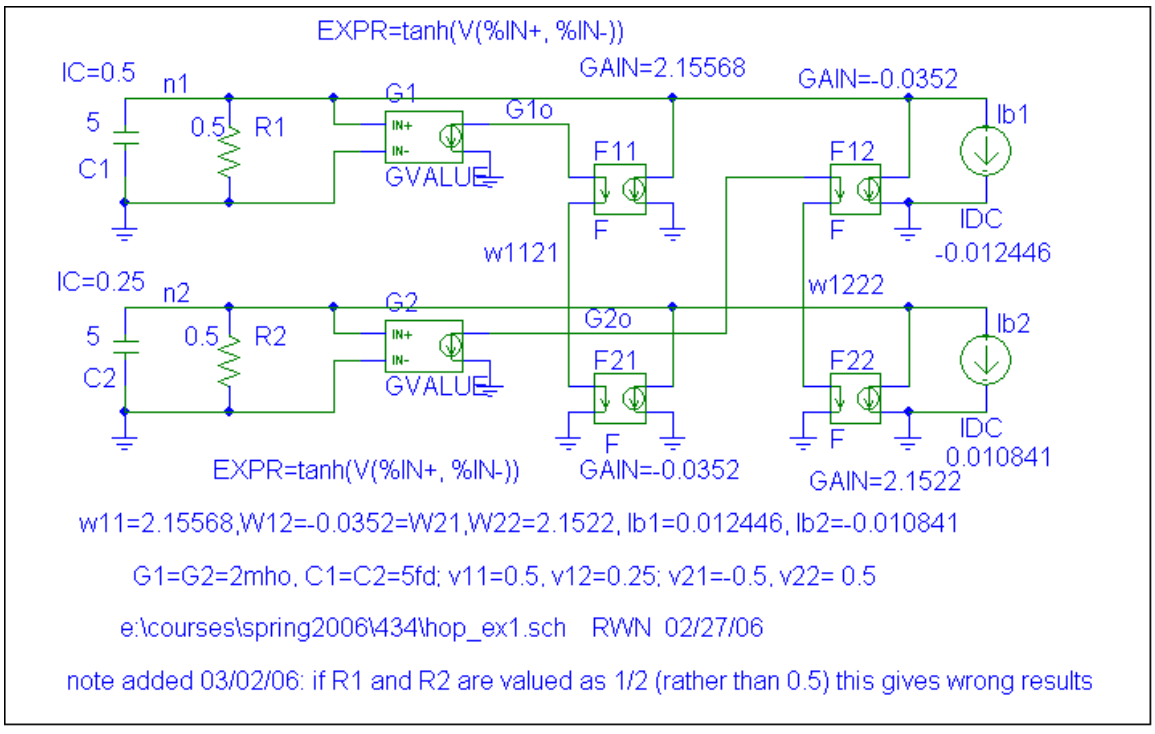
$$C\frac{dn}{dt} = +Wa - Gn + I_b \;;\; n(0) \text{ given}$$

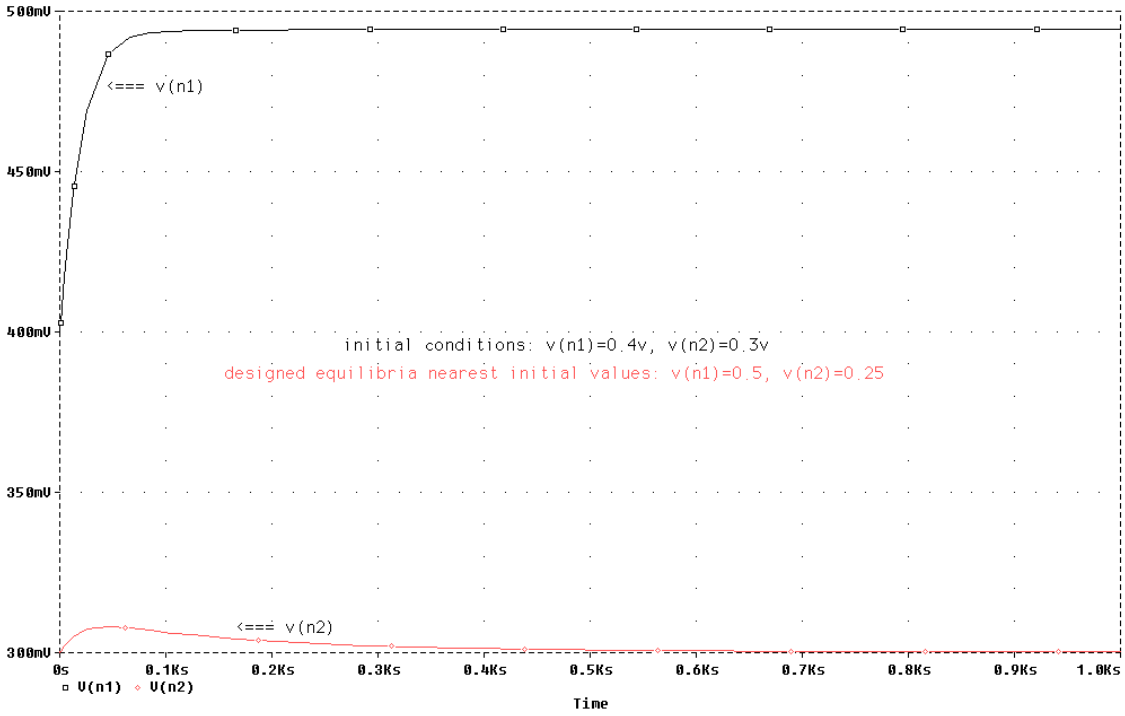
$$a = f(n)$$

$$W = \begin{bmatrix} 2.15568 & -0.035206 \\ -0.035213 & 2.1522 \end{bmatrix}, \quad v1 := \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix} \quad v2 := \begin{bmatrix} -0.5 \\ 0.5 \end{bmatrix}$$

$$G := \begin{bmatrix} G1 & 0 \\ 0 & G2 \end{bmatrix} \quad C := \begin{bmatrix} C1 & 0 \\ 0 & C2 \end{bmatrix} \quad v3 = \begin{bmatrix} 0.494563 \\ 0.3 \end{bmatrix}, \quad I = \begin{bmatrix} 0.012446 \\ -0.010841 \end{bmatrix},$$

$$y(v) := \begin{bmatrix} \tanh(v_1) \\ \tanh(v_2) \end{bmatrix}$$




500mV
450mV
400mV
350mV
300mV
<=== v(n1)
initial conditions: v(n1)=0.4v, v(n2)=0.3v
designed equilibria nearest initial values: v(n1)=0.5, v(n2)=0.25
<=== v(n2)
0s
0.1Ks
0.2Ks
0.3Ks
0.4Ks
0.5Ks
0.6Ks
0.7Ks
0.8Ks
0.9Ks
1.0Ks
V(n1) V(n2)
Time