Problem 1: Problem 9.1.

Problem 2: Problem 9.2.

Problem 3: Problem 9.5.

Copy the files jj.m, jjivh.m, and jjplot.m from the email to your MATLAB directory on Athena.

(a) Use jjivh.m to plot the IV's for a number of different Stewart-McCumber Parameters, say ($\beta_c = 0.1, 0.5, 1, 5, 10, 15$). Use these to graph (1) The current where the junctions switches from the zero-voltage state to the finite voltage state as the current is increased from zero current and (2) the current where the junctions switches from the finite-voltage state to the zero-voltage state when the current is decreased from a high value. (You may note some numerical errors if you make $\beta_c \gg 10$, which can be resolved by increasing the integration time, but don’t worry about doing this.)

(b) Use jjplot.m to plot the time dependence and voltage dependence for a few selected points for $\beta_c = 0.1$ and $\beta_c = 10$. The program asks for an initial point $[\phi, \dot{\phi}]$.

(c) An often used approximation is that $\phi(t) = \omega_o t + A \sin (\omega_1 t + \delta)$, where $\omega_o$, $\omega_1$, and $\delta$ depend on the average dc voltage. Use your results from part (b) to estimate what $\omega_0$ and $\omega_1$ are in terms of the average dc voltage. Note that time is in units of $\sqrt{J/F_{RC}}$ and the voltage is in units of $I_C R$.

Outline of report, including references is due on November 7, 2001.