ECE692

Comparison of Numerical Integration and Direct Solution of State Space Equations

In addition to providing closed-form expressions, the discrete time state space model yields results which are insensitive to the size of time steps. This problem explores this characteristic.

Example code for a buck-boost converter is available on the course webpage. This example code uses known steady-state solution vectors `X0` and `XDTs` to initialize `lsim()` to steady-state. Run the code with `tsteps=1000` and view plotted steady-state waveforms.

Now, add additional code which uses the same time vector `t`, but solves the states $\mathbf{x}(t)$ in closed-form using the techniques discussed in class. On the same axes, plot

- the original `lsim()` result with `tsteps=1000`
- the `lsim()` result with `tsteps=10`
- the waveforms generated by your additional code for both values of `tsteps`

Submit your code as well as a short commentary on the result.