

## EE394J-10 Homework Assignment #1

Due date: 10/03/2012

For all questions elaborate some few conclusions or comments about the results. For all questions with simulations include a graph with the used model. State all the assumptions considered in the simulations. You are free to do as many assumptions you consider appropriate.

1) Find a paper discussing a dynamic model of a fuel cell. This paper can be the one referenced in the class notes or can be some other paper you prefer more. Simulate the response of a fuel cell with a sudden change of load. As stated above you can do all the assumptions you consider appropriate. These assumptions include parameters, such as voltage and power output (which you can obtain from the paper you select), and the fuel cell model characteristics. I.e., you can simplify the model provided that you still keep the dynamic nature of the model and that the simplifications are justified with an explanation. Plot also the steady state voltage-current characteristic that you obtain using the same model but with static load changes (i.e., the load changes very slowly).

2) Consider that you are the new proud owner of a house in Austin, which has a roof with a 20° tilt and with a 200° azimuth. Assume a typical load for your new home. You can use Austin Energy's guide for PV systems to help you through the calculations. The guide can be found at <http://www.austinenergy.com/Energy%20Efficiency/Programs/Rebates/solar%20rebates/estimatingPVSystemSizeCost.pdf>. Using this information, browse the Internet and select some suitable PV modules and calculate their cost. If the power electronics plus the installation cost equals that of the PV part, what is the total cost? How does this compares with the average electricity residential cost in Texas found at [http://www.eia.doe.gov/cneaf/electricity/epm/table5\\_6\\_b.html](http://www.eia.doe.gov/cneaf/electricity/epm/table5_6_b.html)? *Extra credit:* Calculate the cost when you consider Austin Energy's rebates and tax incentives.