Homework 1 (90 points)

ENERGY 294 - Electrochemical Energy Storage Systems: Modeling and Estimation

Spring Quarter 2018

Dr. Simona Onori

Due April 12, 2018 at 12 PM (Electronic pdf copy in CANVAS and hard-copy to the TA)

Problem 1 (30 points)

Green Car Congress (GCC) is a newsfeed website dedicated to provide the latest information and news about energy options, technologies, products, issues, and policies related to sustainable mobility. GCC reports any relevant development around the world regarding alternative vehicles and powertrains, clean and alternative fuels, alternative sources of clean energy, technologies to curb greenhouse gas emissions which accelerate global warming resulting in climate change, and related policies and sustainability issues in general.

1. Go to the Green Car Congress website under Hybrids and examine the postings starting from June 2017. (http://www.greencarcongress.com/hybrids/index.html)
2. Select 3 postings you deem particularly "worthy" or newsworthy in your own view.
3. For each selected posting, write a brief summary (narrative text, not bullet point list) of the posting (and any other relevant material related to that posting from any other source, if any) and write a short description of why you think this is a particularly important posting – Limit your write-up for each posting to no more than 1 page, including text, figure(s), photo(s) and links/ bibliographical references.
4. Turn in your answer collating the 3 postings.

Problem 2 (30 points)

The Estimated U.S. Energy Consumption flow chart released by Lawrence Livermore National Laboratory every year details the sources of energy production and how Americans are using energy (see https://flowcharts.llnl.gov).

1. Analyze the Estimated U.S. Energy Consumption flow charts from over the past 5 years, i.e., from 2012 to 2016.
2. Show the energy usage from the estimated a) Petroleum, b) Solar, and c) Coal in percentage (and after normalizing the energy values over the 5 year period) as a function of year.

Problem 3 (30 points)

The Battery Test Manual for Electric Vehicles, (https://inldigitallibrary.inl.gov/sites/sti/sti/6492291.pdf), is based on technical targets for commercial viability established for energy storage development projects aimed at meeting system level Department of Energy (DOE) goals for electric vehicles (EVs). The specific procedures defined in this manual support the performance and life characterization of advanced battery devices under development for EVs. After reading the manual, answer the following questions:

1. How can test-induced degradation mechanisms be minimized?
2. What is the recommended resting time after each charge (or discharge) prior to further testing?
3. Define the Battery Size Factor (BSF).
4. What are the only two tests that are defined in terms of requested current as opposed to requested power?