EE 5220 - Lecture 41 Wed Apr 17, 2024

Topics for Today:

- Course Info:
  - Web page: https://pages.mtu.edu/~bamork/ee5220/
  - Book, references, syllabus, more are on web page.
  - Software - Matlab. ATP/EMTP [License - www.emtp.org] ATP tutorials posted on our course web page
  - EE5220-L@mtu.edu (participation = half letter grade, 5%)

- Term Project - presentation - completed by noon, Mon April 22nd
- Term Project Report - Final version, due 9am Wed Apr 24th.
- Term Project - Teams present on Mon Apr. 22nd 3pm - 5pm)
- Class collaborative exercise -- participation points only! Due Fri 5pm.
  - E-mail discussion, contribute, assemble results, add notations, hand in.
  - Case 1a and 1b simulation posted at L40. Three-pole switching, CB issues
  - Case 2 - statistical switch
  - Case 3 - repeat Dr. Bohmann's example on reactor switching.
- All late work (grace period) must be turned in by noon April 25th.
- Grade submission deadline (immovable) is 8am Apr 30th. Given lead times in grading, it is impossible to accept late work past Thurs April 25th.

Class Exercise or "homework 11"
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As discussed in the previous lectures, we have one last collaborative class exercise which will count as a participation activity. Due date is Friday of Week 14, but a grace period is allowed until noon on Thurs Apr 25th.

Unlike other homeworks, the solution can be freely-shared and discussed and collaborated on via our e-mail discussion forum. Submittal is by project teams. Case 1 simulation has been built for you, but you should take a look at parameters and modify them for the voltage level and MVAR size of the cap bank of your choosing.

Your team can choose one of the cases. Start a discussion thread on the problem you choose, if it has not already been started. Document the problem and the simulation, and provide a discussion to explanation what is happening and why in the context of the concepts and theories involved. This can be contributed by multiple teams into the discussion thread.

Case 1a - Cap bank deenergization, with grounded neutral.
Case 1b - Cap bank deenergization, with ungrounded neutral.

Case 2 - Statistical Switching - Synchronized closing (energization) of cap bank.

Case 3 - Reactor Deenergization, pp.10-15 of Reactor Switching Handout.

Class Exercise or "homework 11"
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As discussed in the previous lectures, we have one last collaborative class exercise which will count as HW11. This can be turned in any time before noon on Thurs Apr 26th. The solution can be freely-shared and discussed and collaborated on via our e-mail discussion forum. Submittal should be just like with homeworks, one by each homework pair, or it can be individually submitted if you work alone. Case 1 simulation has been built for you, but you should take a look at parameters and modify them for the voltage level and MVAR size of the cap bank of your choosing.

Case 1a - Cap bank deenergization, with grounded neutral.
Case 1b - Cap bank deenergization, with ungrounded neutral.

Case 2 - Statistical Switching - Synchronized closing (energization) of cap bank.

Case 3 - Reactor Deenergization, pp.10-15 of Reactor Switching Handout.

In each case, document the problem and the simulation, then provide an explanation of what is happening and why in the context of the concepts and theories involved.

$Q = \frac{V^2}{X}$

60-MVAR

69-kV

$V_{p_{LN}} = \frac{69\sqrt{2}}{\sqrt{3}} = 56{,}300$

$X_c = \frac{(56{,}300\sqrt{2})^2}{20\times10^6} = 79.35\,\Omega$

$\sqrt{3}V_{LL}I_L = Q$

$I_p = 710\ A$

$= \frac{1}{\omega C}$

$= 33.43\ mF$

$\phi A - 0.004166\overline{6}$

$\phi B - 0.0971$

$\phi C - 0.0696$