ECE 404/504: Lecture 39

Error fix in the ATP and EMTDC files

- **You do not need to fix this in your homework assignments unless you want to.**

\[
P_{3\text{ph}} = \frac{3}{2}(v_{sd} \cdot i_d + v_{sq} \cdot i_q + v_0 \cdot i_0)
\]

- This is implemented correctly in the files

\[
Q_{3\text{ph}} = \frac{3}{2}(v_{sq} \cdot i_d - v_{sd} \cdot i_q)
\]

- The simulation files implement the negative of this.

Corrected implementation in ATPDraw:

![Diagram of ATPDraw implementation](image1)

And in PSCAD/EMTDC

![Diagram of PSCAD/EMTDC implementation](image2)

Closed loop control cases:

\[
i_{d,\text{ref}} = \frac{2}{3} \frac{P_{3\text{ph}}}{v_{sd}} \quad \text{Correct in the files.}
\]

\[
i_{q,\text{ref}} = -\frac{2}{3} \frac{Q_{3\text{ph}}}{v_{sd}} \quad \text{Sign error in the simulation files. It cancels with the reactive power calculation error, so the results look correct when you plot Q in the simulation results.}
\]
Note, that the same error shows up in the alpha-beta based reactive power calculation example too:

\[
P_{3\text{ph}} = \frac{3}{2} \left( v_{sd}i_d + v_{sq}i_q + v_0i_0 \right)
\]

- This is implemented correctly in the files

\[
Q_{3\text{ph}} = \frac{3}{2} \left( v_{\beta}i_\alpha - v_{\alpha}i_\beta \right)
\]

- The simulation files implement the negative of this.
Another frequent question:

Note that this implements: \( \text{MAGM} \cos(\omega t - \delta) \)

While in EMTDC, I implemented it as:

\( \text{MAGM} \cos(\omega t + \delta) \)