Ongoing List of Topics:

- **URL:** http://www.ece.mtu.edu/faculty/bamork/EE5223/index.htm
- Term Project - last few proj/teams being firmed up and getting moving.
  - Follow timeline, see posting on web page
  - Weeks 6 thru 9 - develop formal outline w/complete reference list

- Protection fundamentals (cont'd):
  - Distance relaying fundamentals: §6.5.6, §6.5.7
  - Observed vs actual Z: Three-terminal lines, series caps
  - Again — overview of bus diff, xfmr diff, synch check, capacitor banks, generators, motors, etc. (take a quick run through Ch.6, also Glover & Sarma, Ch.10).
Fri, Mar 20th
- Arc Flash
- Kevin Demeny
- Flash, skin burn
- Pressure Wave
- Shrapnel

Wed, Mar 25th
- Video taped
- XFMR Prot. Fund.

Fri, Mar 27th
- Ken Behrendt, SEL
- XFMR Protection
Impedance Relaying - (21)

"distance relaying"

30°

$Z_{ph}$

$+ V_{drop, line}$

$J_4 = I_4 - I_{5e} + I_c$

$I_4 = 0$

$V_{drop, line}/V_{TR}$

$Z_{ph} = \frac{I_{line}}{CTR}$

Pos seg.

Source
R-X plane

Set 21-relay to trip if \( Z \) goes inside circle.

\[ \Delta X = \frac{x}{r} \text{ ratio} \]

Moves left of line with increase in load.

\[ R \uparrow \text{ pre-fault} \]

Pre-Fault Load

\[ \Delta x = \Delta Z \]

\[ \Delta Z = \frac{V_{bus}}{I_{load}} \]

Local ground potential at Relay (i.e. VT)

\[ (0,0) = \]

\[ \Theta = -\phi \]
- Drainage Reactors
- Isolation Transformers
- Surge Arresters

Leased Lines ≤ 300V
Figure 12.11 Protection zones with distance relays: (a) time-distance plot; (b) $R-X$ diagram plot.