POWER FLOW

TODAY

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AGENDA

- Announcement
- Power Flow Basics
- Power Flow Demo
- Discussion?

ANNOUNCEMENT

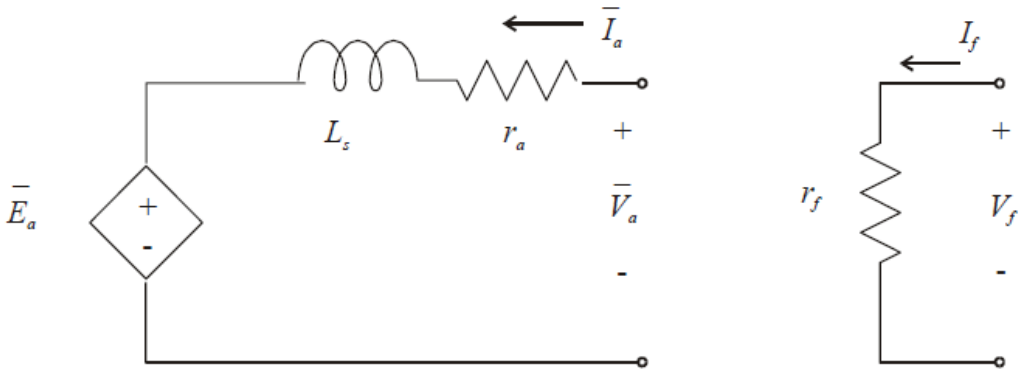
- Accenture: fellowship and internship opportunities
- TCIPG Seminar today, so we will be ending early

POWER FLOW BASICS

POWER FLOW CONCEPT (INTRO)

http://tcipg.org/applet-pg

POWER FLOW



r_a = Armature resistance per phase

x_s = Synchronous reactance per phase

$\bar{E}_a$ = Internal machine voltage

$\bar{I}_a$ = Armature phase current

$\bar{V}_a$ = Terminal line - to - neutral voltage

R_f = Field resistance

I_f = Field current

K_f = Field constant with units of henries

V_f = Field voltage

$\omega_s = 2\pi f_1$

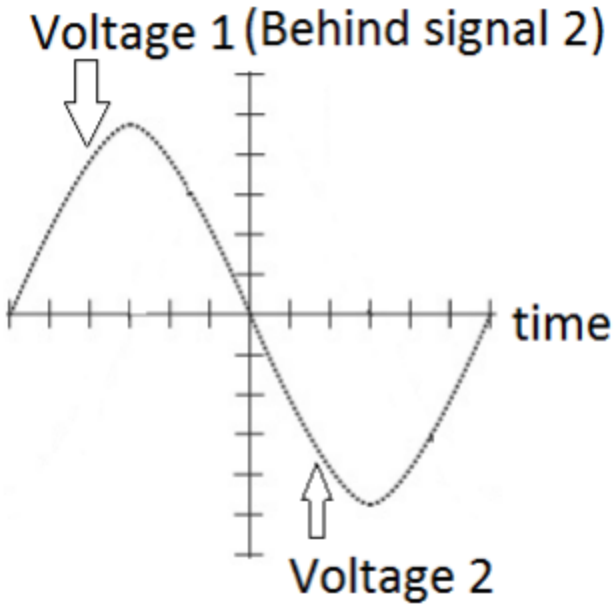
$\delta = \angle\bar{E}_a - \angle\bar{V}_a$

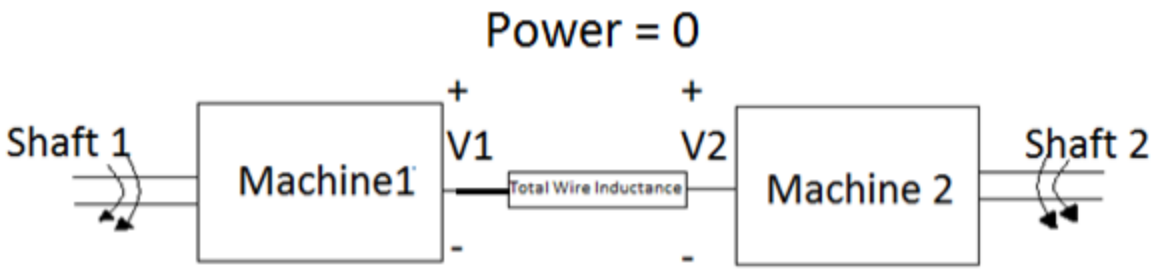
$\phi = \angle\bar{V}_a - \angle\bar{I}_a$

$$P_{IN} = \frac{3\left|\bar{V}_a\right|\left|\bar{E}_a\right|}{x_s}\sin\left(-\delta\right)$$

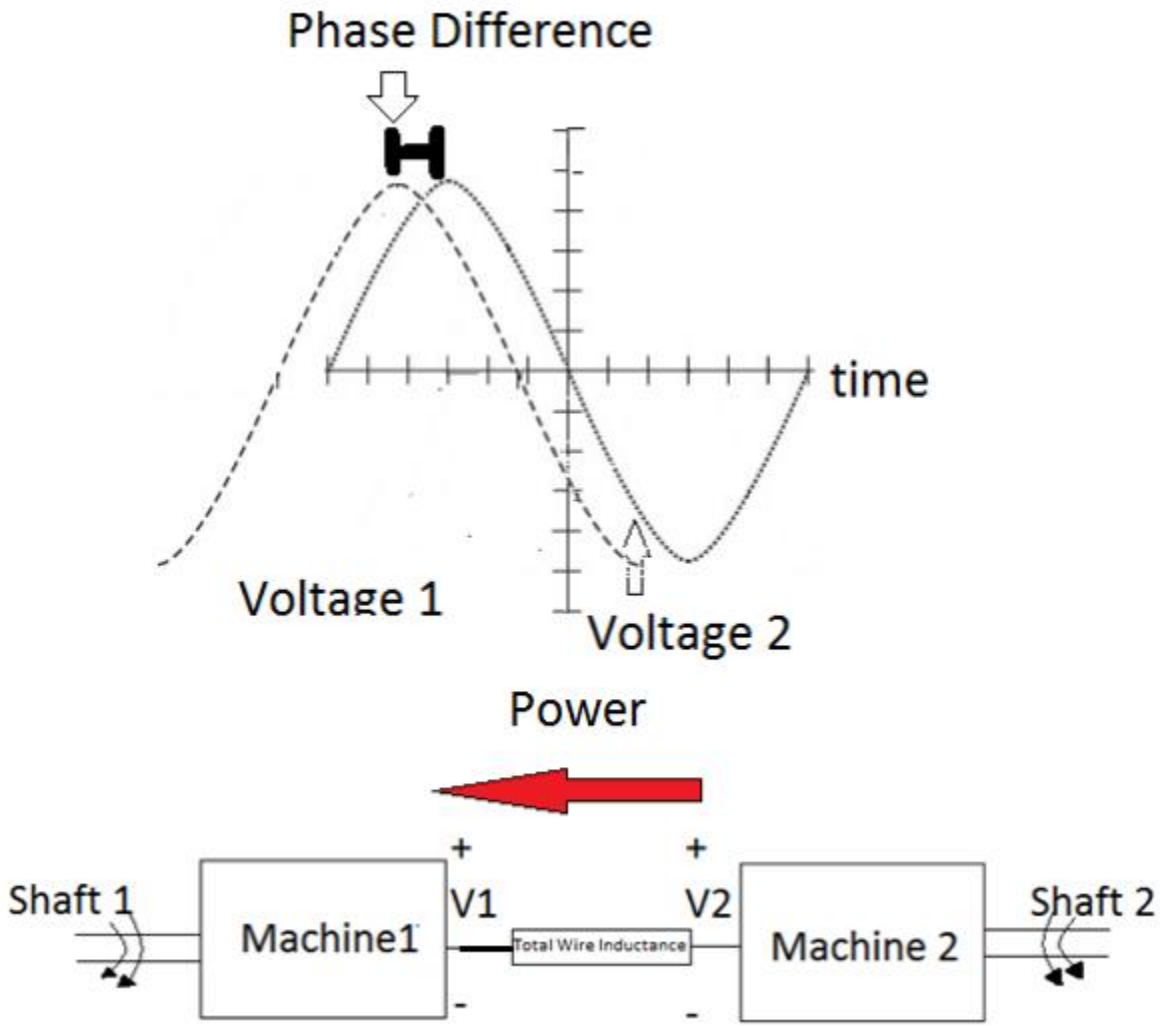
$$Q_{IN} = \frac{3\left|\bar{V}_a\right|^2}{x_s} - \frac{3\left|\bar{V}_a\right|\left|\bar{E}_a\right|}{x_s}\cos\left(\delta\right)$$

POWER FLOW DEMO CONCEPT

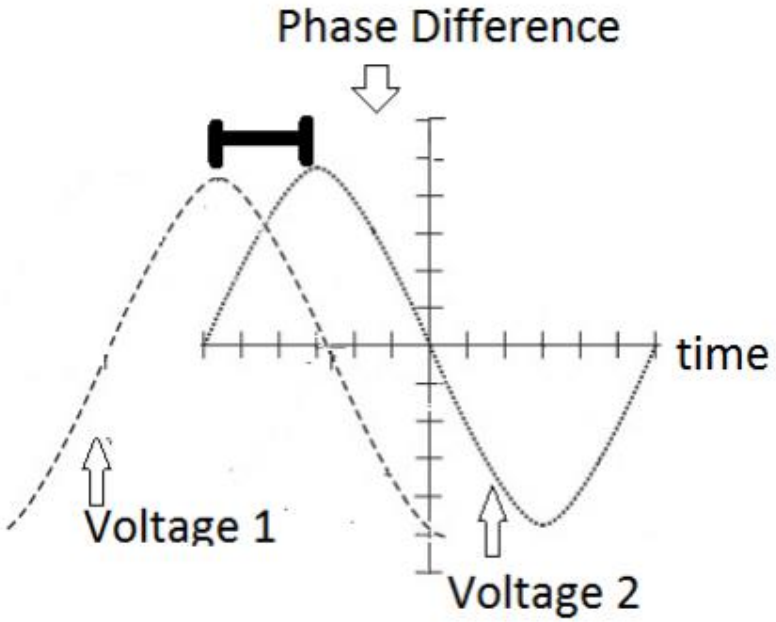


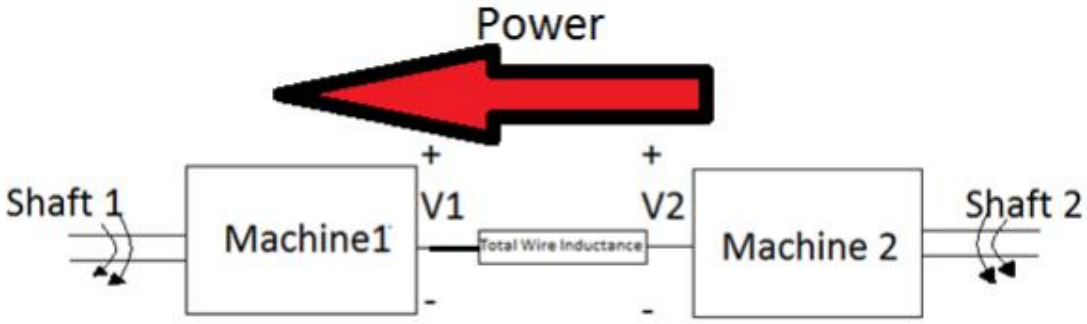


POWER FLOW DEMO CONCEPT

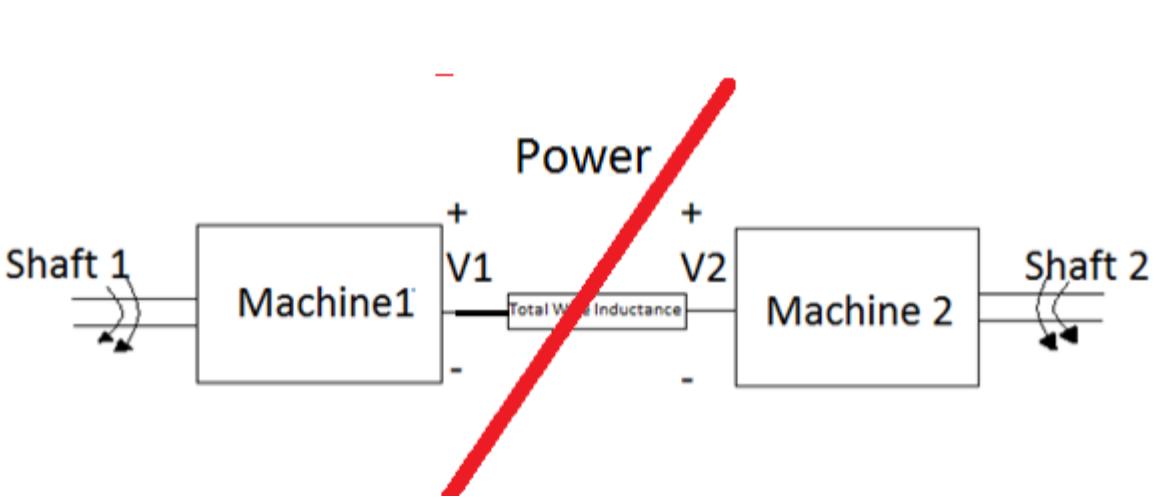


POWER FLOW DEMO CONCEPT





POWER FLOW DEMO CONCEPT



REFERENCE

[1] P. W. Sauer, P. T. Krein, and P. L. Chapman, ECE 431 Electric Machinery Course Guide and Laboratory Information, 4th ed., University of Illinois, Urbana, IL, Jan. 2010.

[2] Alikpala Mark, et.all, Intro to Power Lab Concepts, 2012.