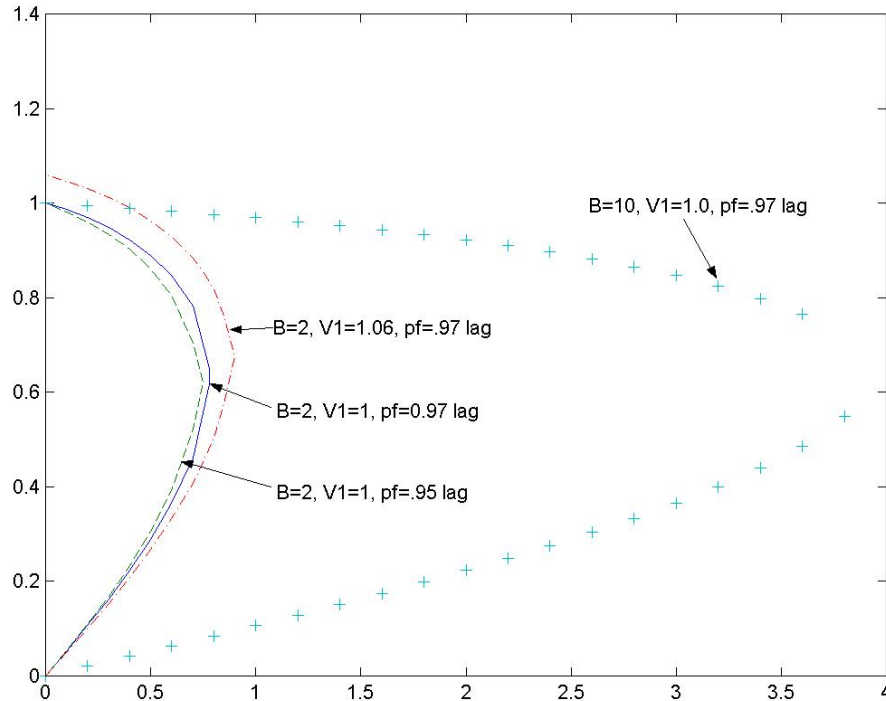


## Homework #1 - Solutions

1. Draw the PV-curve for the following cases, and for each, determine the loadability.

- $B=2$ ,  $|V_1|=1.0$ ,  $\text{pf}=0.97$  lagging
- $B=2$ ,  $|V_1|=1.0$ ,  $\text{pf}=0.95$  lagging
- $B=2$ ,  $|V_1|=1.06$ ,  $\text{pf}=0.97$  lagging
- $B=10$ ,  $|V_1|=1.0$ ,  $\text{pf}=0.97$  lagging

Identify the effect on loadability of power factor, sending-end voltage, and line reactance.

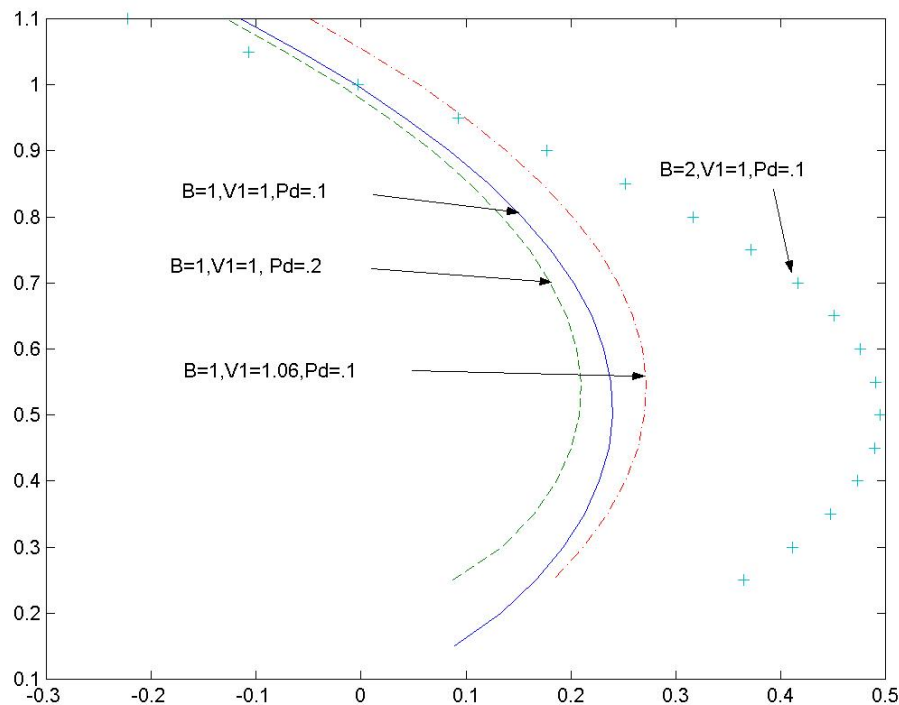


- Comparing the plot of  $B=2$ ,  $|V_1|=1.0$ ,  $\text{pf}=0.95$  lagging with the plot of  $B=2$ ,  $|V_1|=1.0$ ,  $\text{pf}=0.97$  lagging, we see that decreasing (lagging) power factor (or increasing reactive load) results in decreased loadability.
- Comparing the plot of  $B=2$ ,  $|V_1|=1.06$ ,  $\text{pf}=0.97$  lagging with the plot of  $B=2$ ,  $|V_1|=1.0$ ,  $\text{pf}=0.97$  lagging, we see that increasing sending end voltage results in increasing loadability.
- Comparing the plot of  $B=10$ ,  $|V_1|=1.0$ ,  $\text{pf}=0.97$  lagging with the plot of  $B=2$ ,  $|V_1|=1.0$ ,  $\text{pf}=0.97$  lagging, we see that increasing line susceptance (decreasing line reactance) results in increasing loadability.

2. Draw the QV-curves for the following cases, and for each, determine the maximum QD.

- $B=1, |V_1|=1.0, PD=0.1$
- $B=1, |V_1|=1.0, PD=0.2$
- $B=1, |V_1|=1.06, PD=0.1$
- $B=2, |V_1|=1.0, PD=0.1$

Identify the effect on maximum QD of real power demand, sending-end voltage, and line reactance.



- Comparing the plot of  $B=1, |V_1|=1.0, PD=0.2$  with the plot of  $B=1, |V_1|=1.0, PD=0.1$ , we see that increasing real power demand results in decreased reactive loadability.
- Comparing the plot of  $B=1, |V_1|=1.06, PD=0.1$  with the plot of  $B=1, |V_1|=1.0, PD=0.1$ , we see that increasing sending end voltage results in increasing reactive loadability.
- Comparing the plot of  $B=2, |V_1|=1.0, PD=0.1$  with the plot of  $B=1, |V_1|=1.0, PD=0.1$ , we see that increasing line susceptance (decreasing line reactance) results in increasing reactive loadability.