E157 Lecture 10 Day Plan

Any questions before quiz

Quiz + Team Quiz + Talk through solution

Measuring Q from return loss! Lab 3 debug

- Log plots are tricky, what would S21 be for the S11 shown (show a filter)
- If lossless and terminated 1+S11^2=S21^2
- Therefore, -3dB on S11 plot corresponds to 3dB off peak in S21 plot
- For very low S11, less than -3dB, can use pseudo -3dB point based on S11 min
  Effective S21 peak, linear = sqrt(1- |S11,min, linear|^2)
  Effective S21 -3dB, linear = Effective S21/sqrt(2)
  Effective S11 -3dB, linear = sqrt(1-|Effective S21,-3dB,linear|^2)
- Potentially discuss loaded and unloaded Q & weak coupling

What VNA to use for DP1

- Siglent S11 with filter board input TG, output terminated → easy export, easy calibration
- Siglent S21 with filter board input TG ouptut RF → easy export, calibration harder
- Anechoic VNA → Export is tricky (see Xavier plotter script), do full 2 port cal, watch cables

S-parameters of filters – insertion loss, return loss, Smith Charts

- Can class (1) sketch a Chebyshev II filter response function, (2) draw S21 and S11 for it.
- |S21|^2 = |H(jw)|^2 roughly, both measure power flow
- S21 in band is insertion loss
- S21 out of band is stop-band rejection
- S11 is high out of band, signals bounce off of filters. Transfer over at 3dB corners

Calculate Z parameters for quiz problems