

EE 105 Feedback control systems

Frequency response & compensation

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An op-amp uses feedback

Examine the LM741 datasheet (or another op-amp you like)

What are its properties as a control system component?

Suppose we had a simple non-inverting amplifier;
is there a gain for which this circuit becomes unstable?

What if there is inductance/capacitance in the loop?

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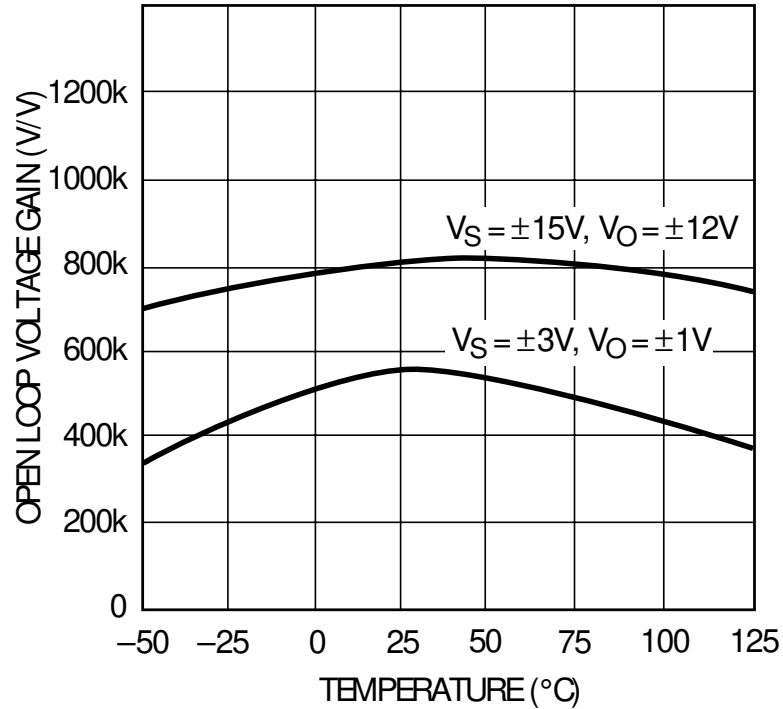
What if there is inductance/capacitance in the loop?

How could we determine stability from a Bode plot?

MATLAB: gain and phase margin

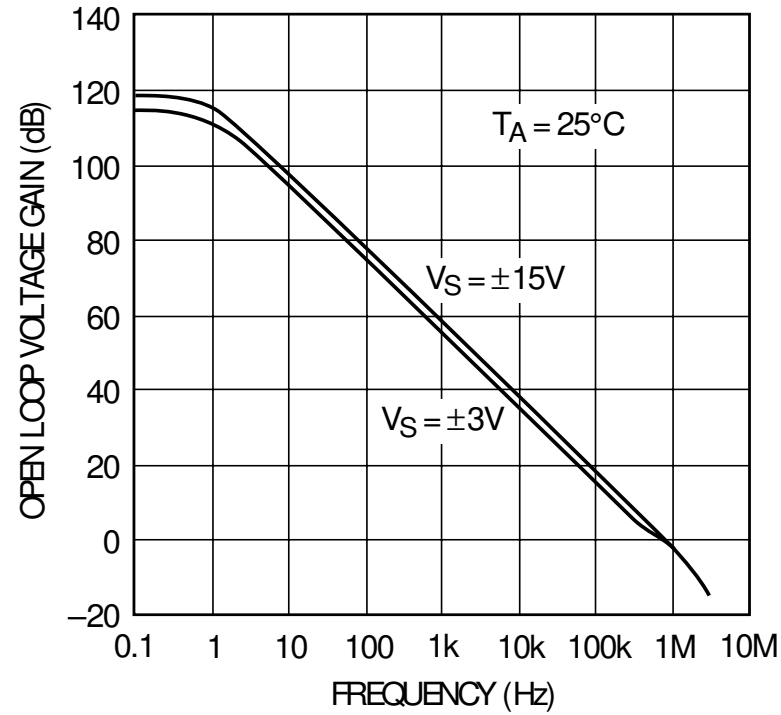
LT1001 datasheet

Open Loop Voltage Gain vs Temperature



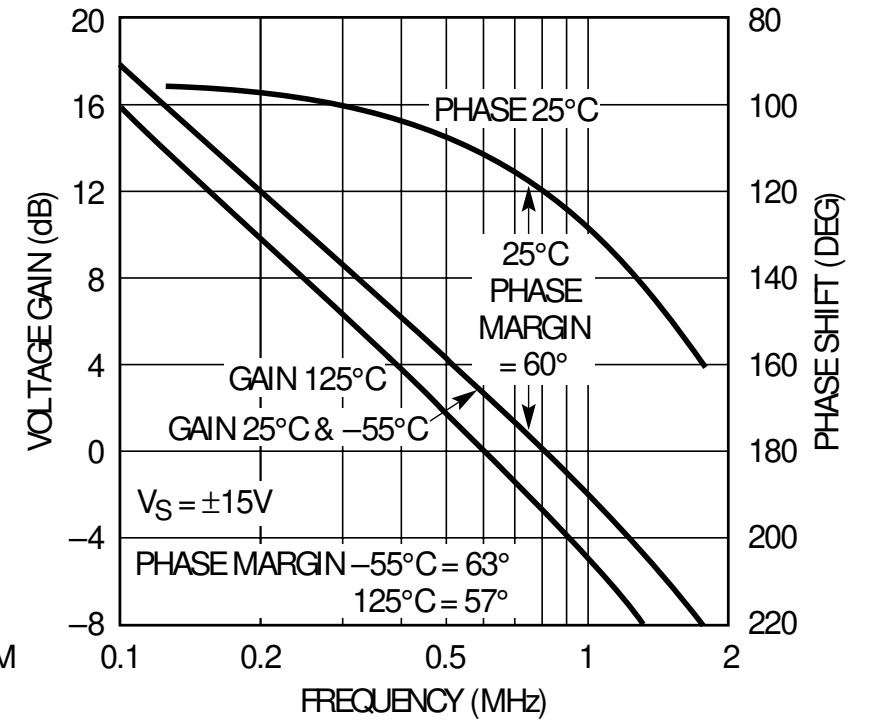
1001 G10

Open Loop Voltage Gain Frequency Response



1001 G11

Gain, Phase Shift vs Frequency



1001 G12

What if we're close to being unstable?

A derivative term might help? (PD control)

But a PD controller has infinite gain...

What if we have steady-state error?

Our low-frequency gain is too low... maybe an integral term would help?