Feedback Compensation
Blackboard 11.1

Feedback Compensation

\[ V_v = a \frac{V_x}{1 + a \frac{V_x}{f}} \]

\[ V_v = \frac{a}{1 + a \frac{V_x}{f}} \]

If \( \left| a \frac{V_x}{f} \right| > 1 \)

Design using

\[ -L.T. = a \frac{V_x}{f} \]

Blackboard 11.2

[Diagram with electrical components and equations]

\[ V_v = \frac{\frac{a}{2} + \frac{V_x}{Y_0}}{1 + \frac{a}{Y_0}} \]

\[ V_v = \frac{\frac{a}{2}}{Y_0} + \frac{\frac{V_x}{Y_0}}{1 + \frac{a}{Y_0}} \]

If \( \left| \frac{a}{Y_0} \right| > 1 \)

\[ \left| \frac{V_x}{Y_0} \right| > \left| \frac{\frac{a}{2}}{Y_0} \right| \]
Feedback Compensation

Viewgraph 11.1

Topology for feedback compensation

- $V_i$ to $V_a$ to $a_1$ to $V_b$ to $f_1$
- Inner or minor loop
- Compensating feedback element
- Outer or major loop

Viewgraph 11.2

Two-port compensating network

- $I_n$ to $V_n$ to $V_m$
- To input of second stage
- From output of second stage

Operational amplifier compensated with a two-port network.
Comments

Minor-loop compensation provides a preferable alternative to cascade compensation for many physical systems. Examples include servomechanisms using tachometric feedback and a number of available integrated-circuit operational amplifiers.

The appropriate compensation for a particular application is generally determined by assuming that feedback controls the behavior of the minor loop at the major-loop crossover frequency. The possibility is realistic because the relatively fewer elements included in the minor loop permit it to have a higher crossover frequency.

Reading

Textbook: Sections 5.3 and 13.3.1.

Problem

Problem 11.1 (P5.14)