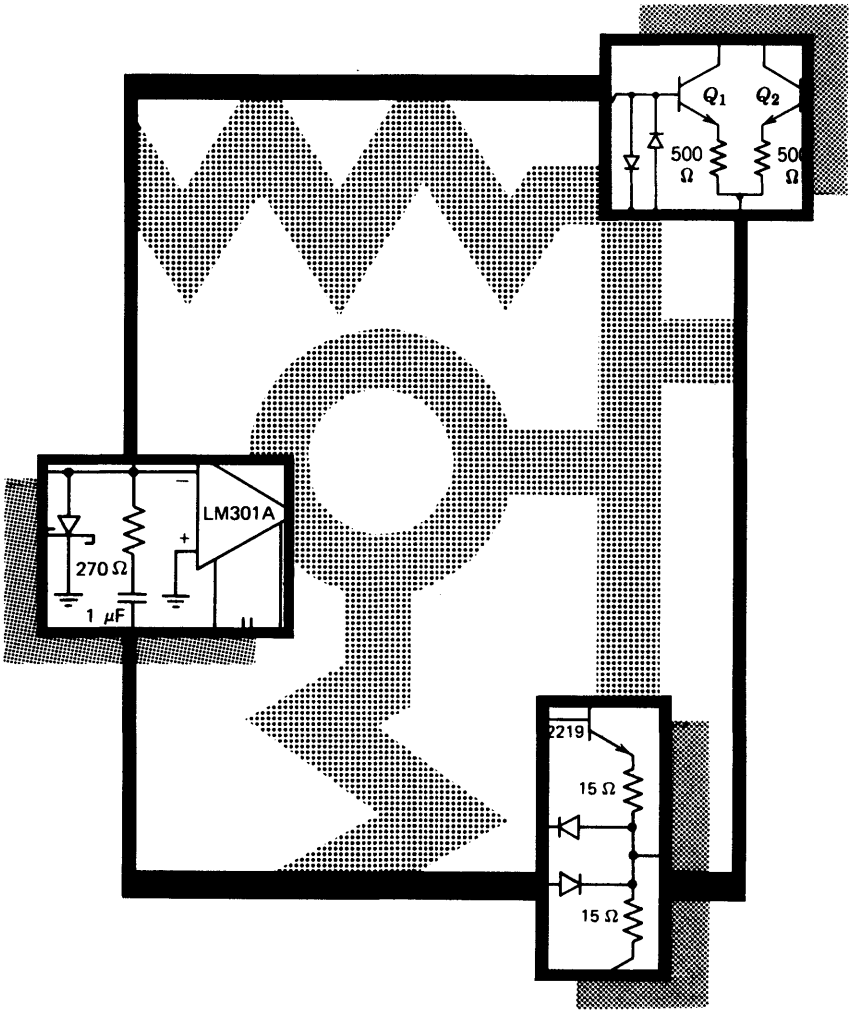
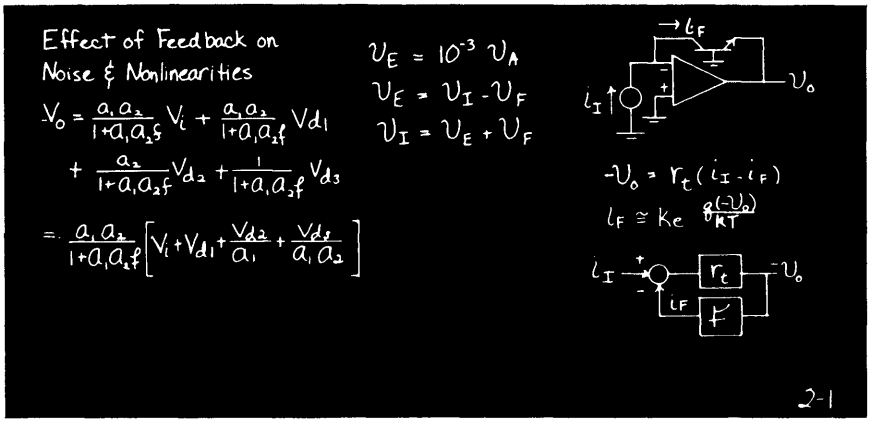
Effects of Feedback on Noise and Nonlinearities

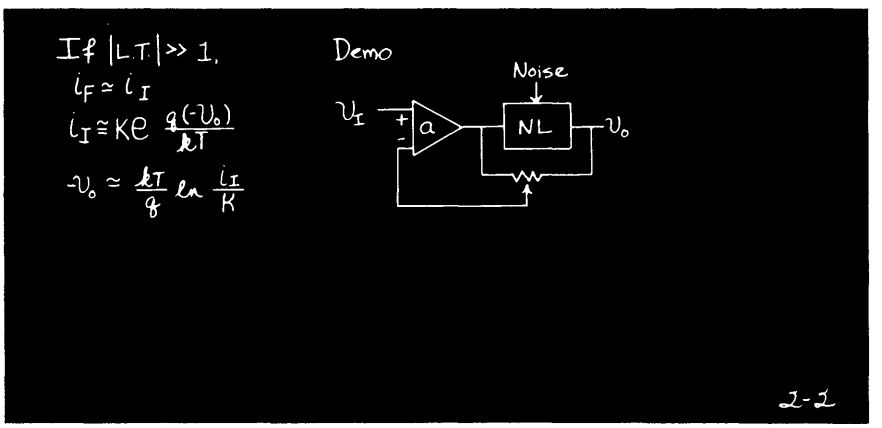
2



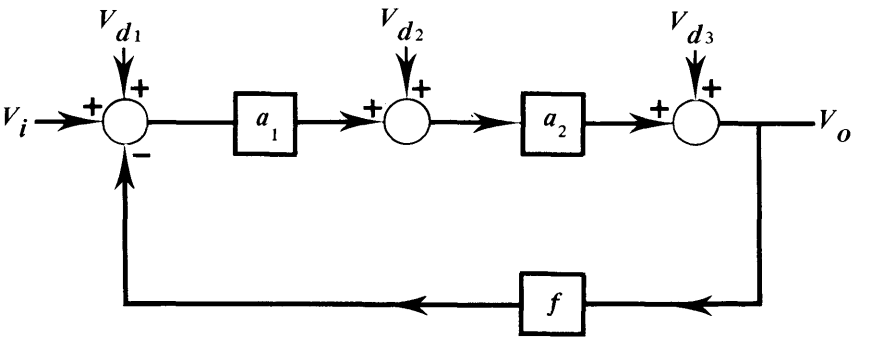
Blackboard 2.1



Blackboard 2.2

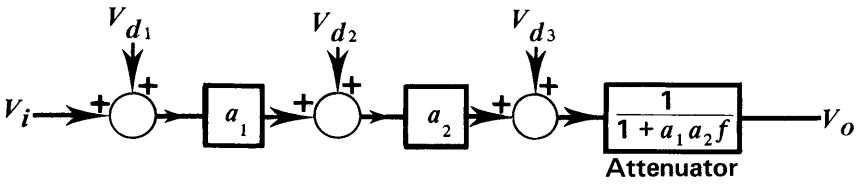


Viewgraph 2.1



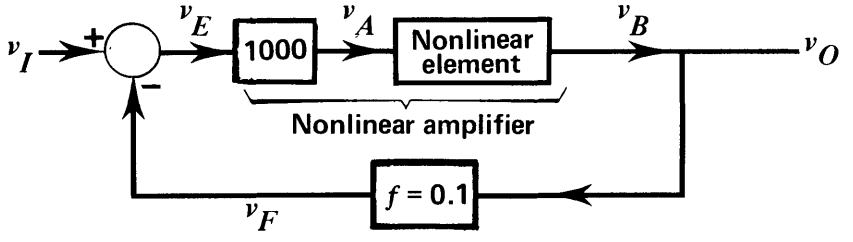
Feedback system illustrating effects of disturbances

Viewgraph 2.2



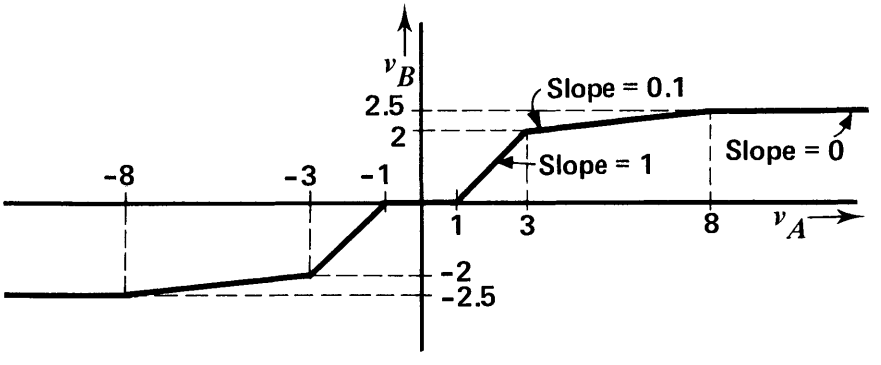
Open-loop system illustrating effects of disturbances

Viewgraph 2.3



System

Viewgraph 2.4

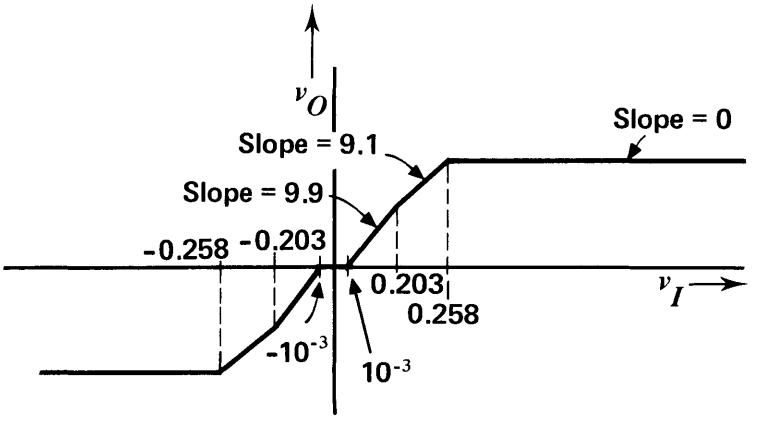


Transfer characteristics of the nonlinear element.

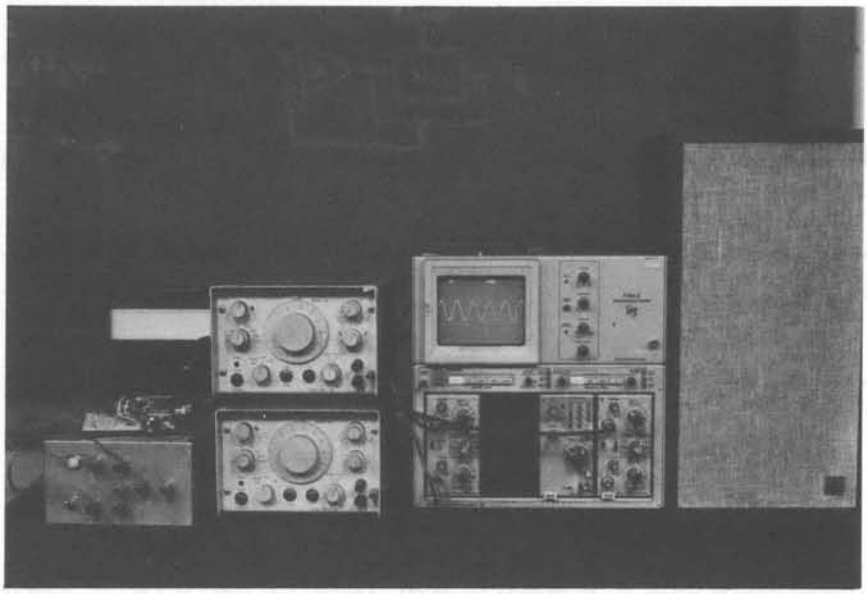
Viewgraph 2.5

Values of Variables at Breakpoints				
v_I	$v_E = v_I - v_F$	$v_A = 10^3 v_E$	$v_B = v_O$	$v_F = 0.1 v_O$
< -0.258	$v_I + 0.250$	$10^3 v_I + 250$	-2.5	-0.25
-0.258	-0.008	-8	-2.5	-0.25
-0.203	-0.003	-3	-2	-0.2
-10^{-3}	-10^{-3}	-1	0	0
10^{-3}	10^{-3}	1	0	0
0.203	0.003	3	2	0.2
0.258	0.008	8	2.5	0.25
> 0.258	$v_I - 0.250$	$10^3 v_I - 250$	2.5	0.25

Viewgraph 2.6



System transfer characteristics
(closed loop) (Not to scale)



Demonstration Photograph 2.1
Nonlinear amplifier demonstration

Comments

Much of our effort in this subject involves the properties of linear feedback control systems. However, feedback is often used to either provide controlled nonlinearities or to moderate the effects of the nonlinearities associated with virtually all physical components.

The economic impact of improving the performance of a nonlinear power handling element by adding gain at a low signal power level of the system can be substantial.

Similarly, feedback often provides a convenient and economical means for reducing the sensitivity of systems to externally applied disturbances.

Reading

Textbook: The material in this lecture parallels that in Sections 2.3.2 and 2.3.4. Please read this material if you have not done so in connection with Lecture 1.

Problems

Problem 2.1 (P2.3)

Problem 2.2 (P2.4)

Problem 2.3 (P2.5): For parts (a) and (b) assume that the sinusoidal disturbance term v_N is equal to zero. Then, for part (c) let v_N equal the indicated value of *sin* 377*t*.

RES.6-010 Electronic Feedback Systems

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