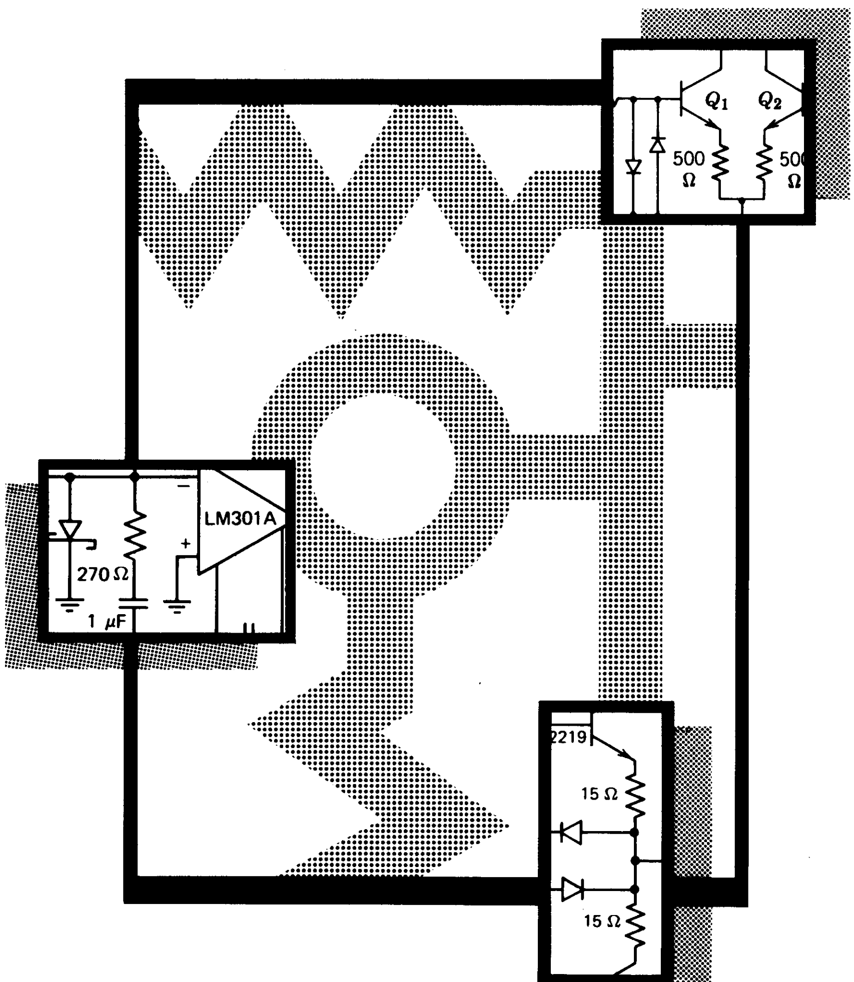
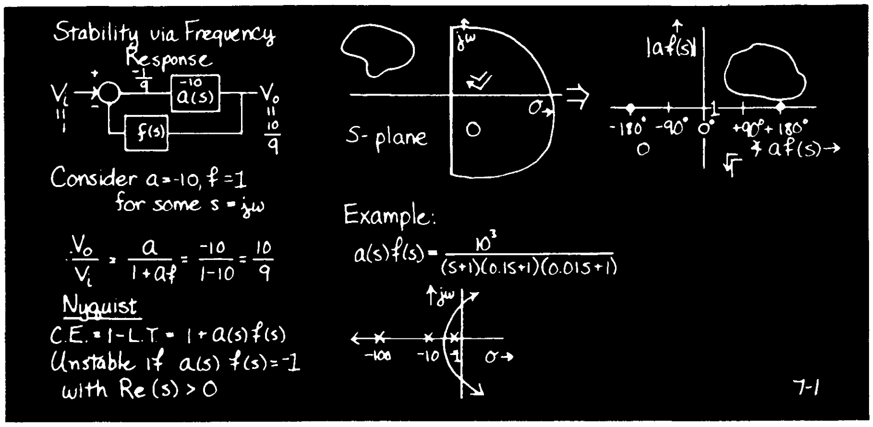
VIDEO COURSE MANUAL

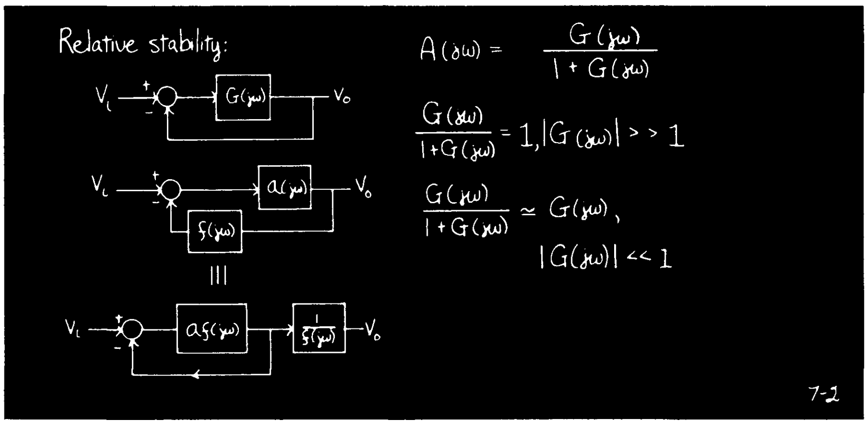
Stability via Frequency Response 7



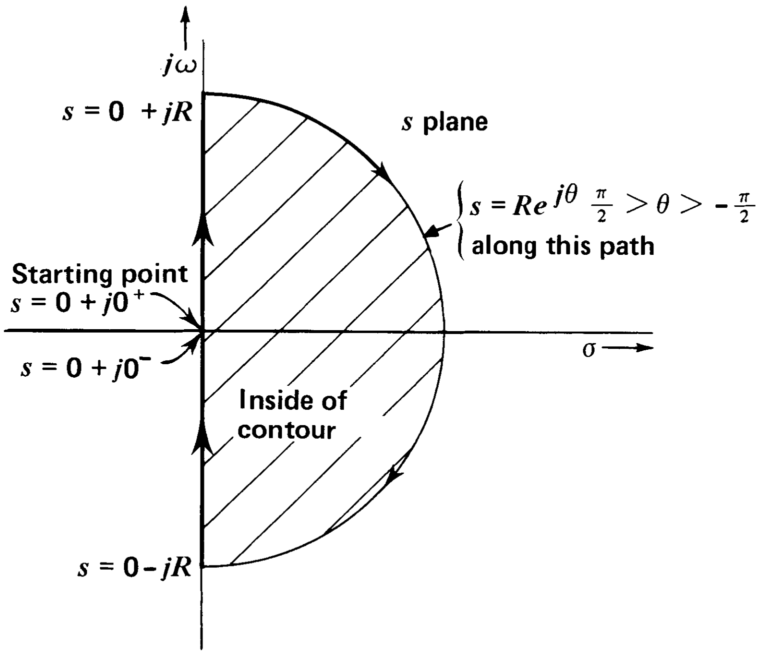
Blackboard 7.1



Blackboard 7.2

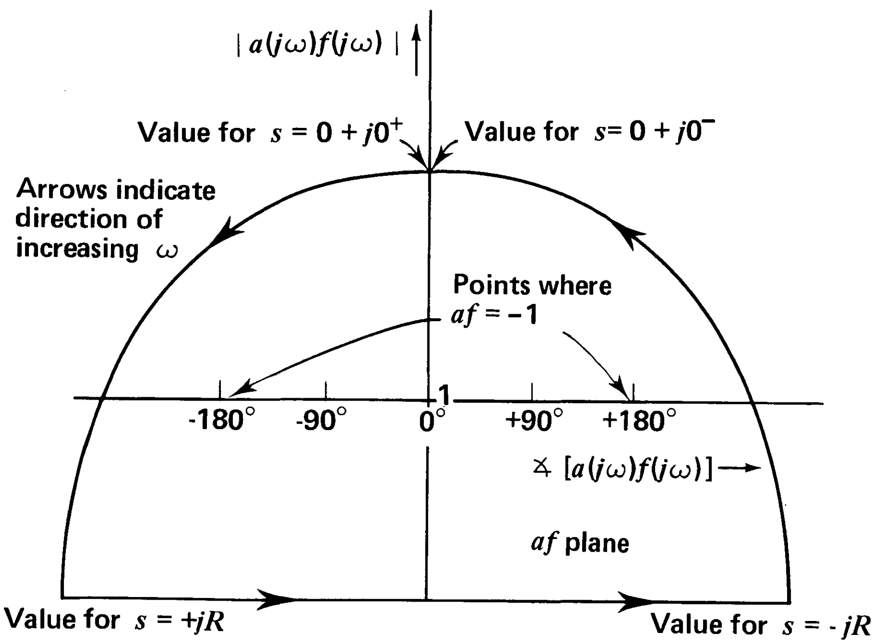


Viewgraph 7.1



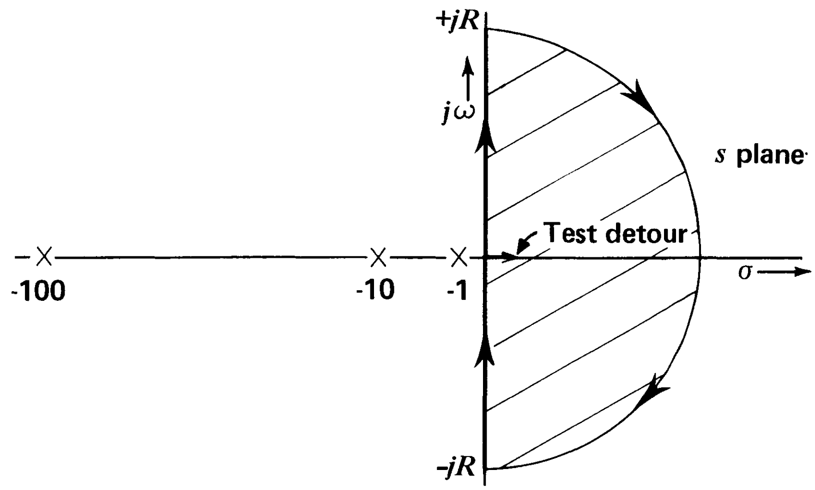
Contour Used to evaluate $a(s)f(s)$.

Viewgraph 7.2



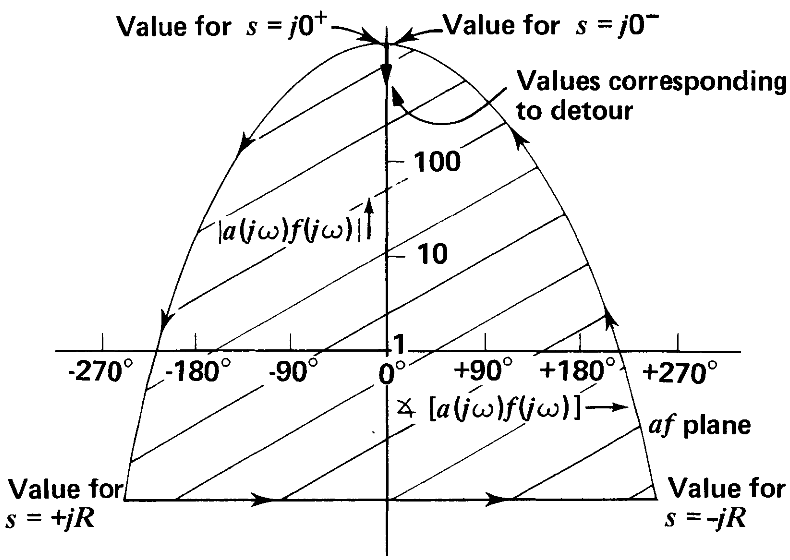
Plot of $a(s)f(s)$ as s varies along contour of previous figure.

Viewgraph 7.3



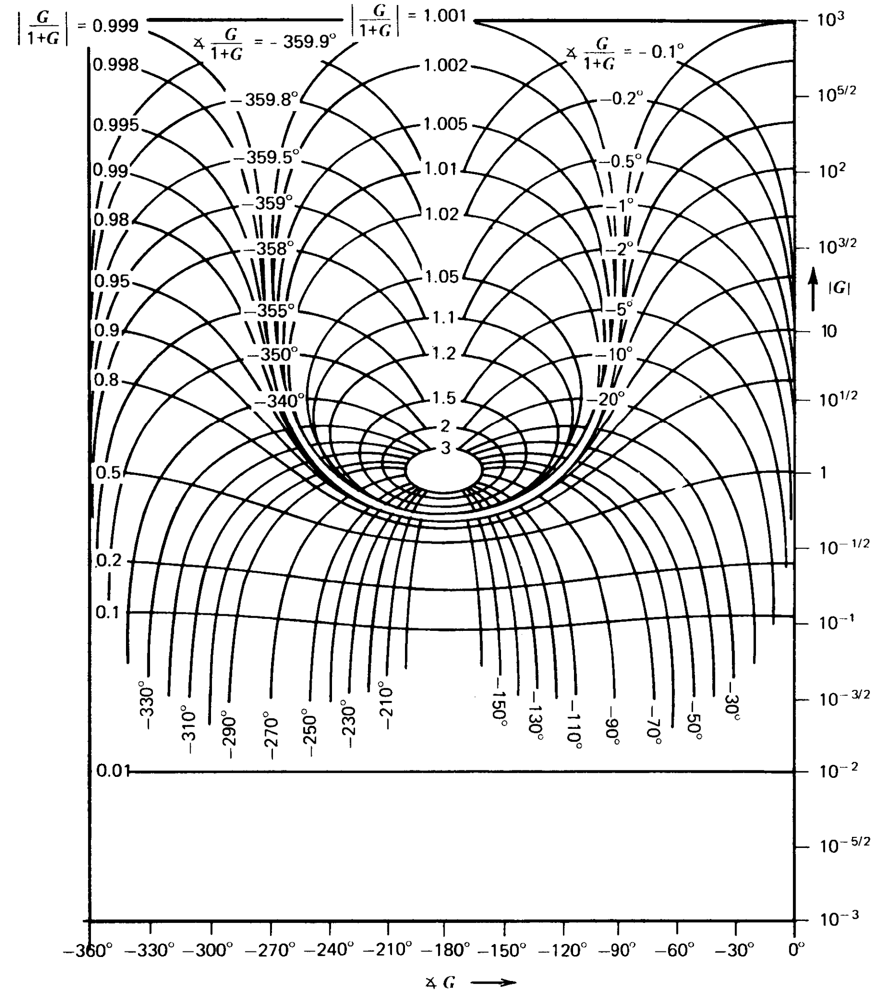
Nyquist test for $a(s)f(s) = 10^3/[(s+1)(0.1s+1)(0.01s+1)]$.
(a) s-plane plot.

Viewgraph 7.4



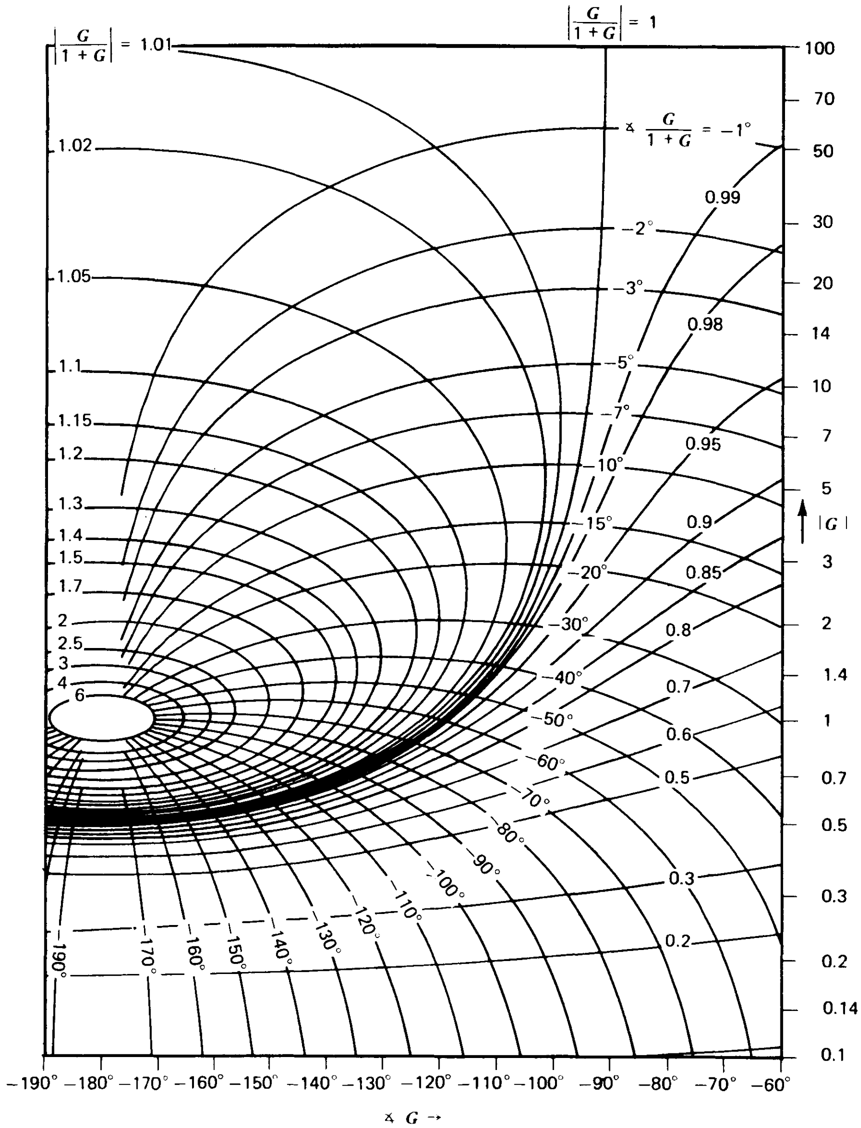
Nyquist test for $a(s)f(s) = 10^3/[(s+1)(0.1s+1)(0.01s+1)]$.
(b) af-plane plot.

Viewgraph 7.5

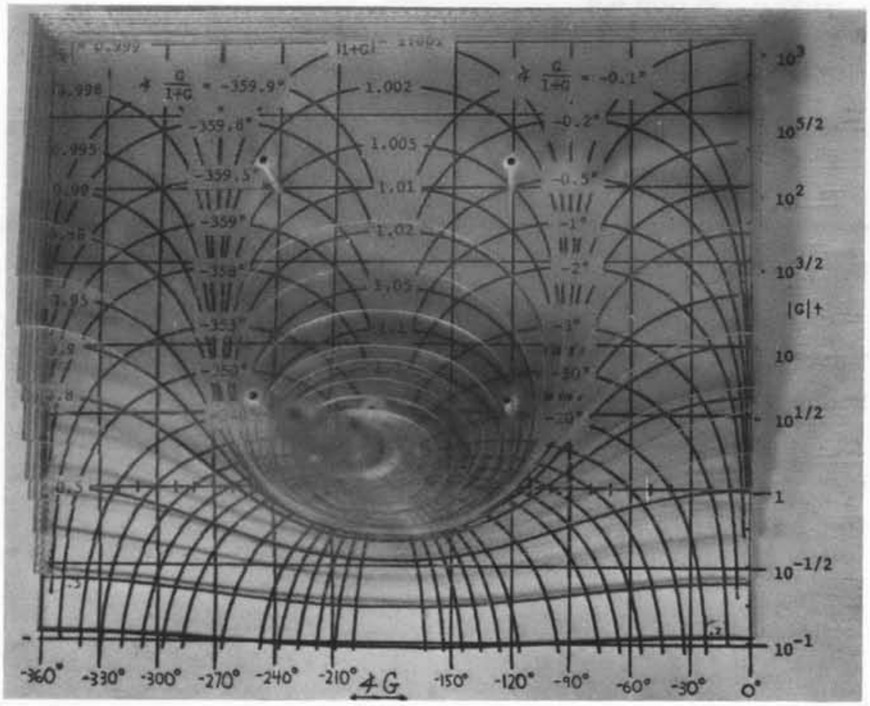


Nichols chart.

Viewgraph 7.6



Expanded Nichols chart.



Demonstration Photograph 7.1
3-dimensional Nichol's chart

Comments

The root-locus method introduced earlier provides a good insight into the behavior of many feedback systems, but it has its limitations. For example, experimental measurements made on an open-loop system may be difficult to convert to the required forms. Furthermore, quantitative results can only be obtained via possibly involved algebraic manipulations.

An alternative that is useful in many cases involves frequency domain manipulations, where the evaluation of relative stability is based on the resonant peak of the closed-loop transfer function. The conversion from open-loop to closed-loop quantities is achieved via the Nichol's chart.

Reading

Textbook: Section 4.4.

Problems

Problem 7.1 (P4.9)

Problem 7.2 (P4.10)

Problem 7.3 (P4.11)