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NASA TECH BRIEF

Performance-Limit Criteria for the Design of Fast-Response Servo-Actuation Systems

The problem:

Fast response (150 to 200 Hz) electrohydraulic valve-controlled piston servo-systems are used as research tools in experimental dynamics and controls studies. The components within these systems must operate at their limits of capability to achieve these high rates of response. Component linearities, often neglected in lower-response applications, must be considered in determining the dynamic-performance capabilities of these servo-actuation systems.

The solution:

An analysis of a typical nonlinear electrohydraulic servo-model has established performance-limit criteria for the design of fast-response servo-actuation systems.

How it's done:

A detailed nonlinear analytical model of these typical fast-response (150 to 200 Hz) servo-actuation systems has been formulated. The accuracy of the model has been verified by comparing model dynamic performance against actual experimental data for a specific application. Component performance evaluations made possible with this nonlinear dynamic model have led to a new generalized limit criterion which in specific applications assists in the selection of system components. This criterion involves a nonlinear limitation internal to the servo-valve device and, when combined with existing limit criteria, will determine a maximum region of dynamic-performance capability for the fast-response systems.

Notes:

1. The information contained in this Tech Brief may be of interest to designers of servo-actuation systems and to the electronics industry in general.
2. The following documentation may be obtained from:

   Clearinghouse for Federal Scientific and Technical Information
   Springfield, Virginia 22151
   Single document price $3.00
   (or microfiche $0.65)

   Reference: NASA-TN-D-5388 (N69-34652), Analysis of Dynamic Performance Limitations of Fast Response (150 to 200 Hz) Electrohydraulic Servos.
3. Technical questions may be directed to:

   Technology Utilization Officer
   Lewis Research Center
   21000 Brookpark Road
   Cleveland, Ohio 44135
   Reference: B70-10152

Patent status:

No patent action is contemplated by NASA.

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