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Goddard Space Flight Center

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Improved Syncom-Type Fluid Damper

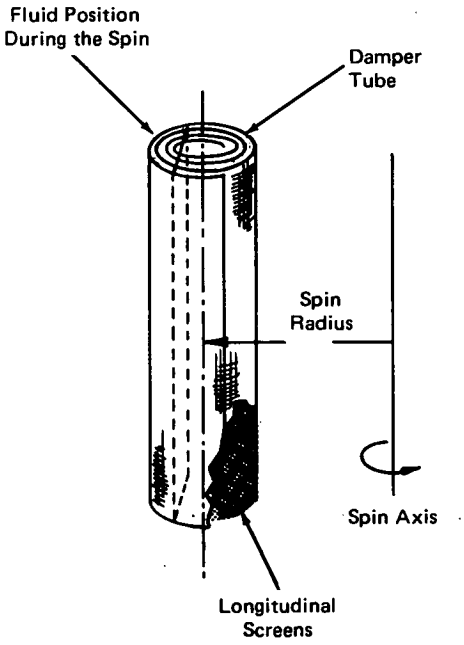

Figure 1. Rolled Longitudinal Screen Damper

The problem:

Nutation dampers are utilized in spinning spacecraft to reduce nutation or wobble around the spin axis. Presently-available fluid nutation dampers, however, are relatively limited, in that the time required to damp nutation is relatively long.

The solution:

Two efficient types of fluid nutation dampers that are simple, reliable, and inexpensive have been developed. In use, either damper may be mounted on a spinning body, parallel to the spin axis of the body and radially displaced from it, to eliminate nutation.

How it's done:

The damper shown in Figure 1 is an elongated tube enclosing a set of rolled longitudinal screens. The tube is filled partially with a nonwetting fluid such as mercury. The screening inside constitutes a porous medium.

In response to nutation, the fluid in the tube is forced through the voids of the screening to change its level continuously, so that the liquid surface remains parallel to the angular momentum vector. Since the porous medium continuously impedes the flow and the flow is laminar, viscous shear forces are maximized, resulting in a greater dissipation of energy by the damper for any level of nutation.

Figure 2 shows another damper tube, which is sectioned into three chambers with two horizontal

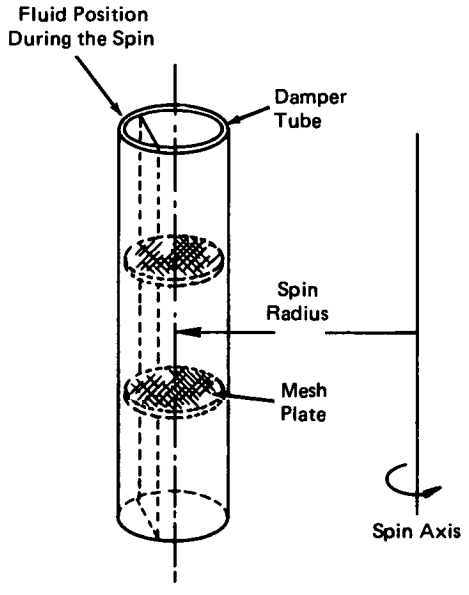

Figure 2. Sectioned Damper

(continued overleaf)

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mesh plates. Again, nonwetting viscous fluid partially fills the tube. In this configuration, damping is effected by both the longitudinal motion of the fluid along the tube wall and the transverse movement through the plates.

Note:

Requests for further information may be directed to:

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Reference: TPS73-10478

Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,737,118). Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

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