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Brief 71-10296

NASA TECH BRIEF

Marshall Space Flight Center

Spin Vector Control of a Spinning Space Station

The problem:

A dual spin space station has an extremely large spin vector which presents control problems and has a complex and often intuitively unexpected influence on the response of the system to internal and external forces.

The solution:

A digital computer program simulates the system and related functions. The program is intended for, but not limited to, altitude control studies of a rotating space station.

How it's done:

Basically, the program is an application of Russel's method of formulating and solving the motion equations for a system of rigid bodies connected by movable joints. In the interest of efficiency, the method is not applied in full generality. Rather, the problem is restricted to configurations and constraints that are closely related to the actual space station systems of interest. Through choices of parameters and optional features in the program, a sufficiently wide range of situations can still be accommodated.

The primary features of the program are:

1. Rotor-stator configuration with single-degree-of-freedom bearing joint.
2. Complete generality in inertial parameters of both rotor and stator.
3. Movable mass on rotor.
4. Nutation damping pendulums on rotor.
5. CMGs on stator.
6. Reaction jets on stator and rotor.
7. Altitude control by reaction jets on CMGs.
8. Nutation removal by reaction jets.
9. Spin control by reaction jets and/or torque motor.
10. Flexibility of control functions by incorporation of control laws in subroutines.
11. Gravity gradient effects.
12. Docking capabilities.

Notes:

1. This program is written in FORTRAN IV for use on the CDC-6400/6500 computers.
2. Requests for further information may be directed to:

   COSMIC
   112 Barrow Hall
   University of Georgia
   Athens, Georgia 30601
   Reference: B71-10296

Patent status:

No patent action is contemplated by NASA.

Source: T. Hendricks of
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