NASA TECH BRIEF

Improved Technique for Digital Simulation of Bending and Slosh Phenomena

A mathematical model representation of bending and slosh phenomena in the Saturn V vehicle results in linear second order differential equations. Currently, hybrid simulations solve these equations on an analog computer. An improved technique has been developed to provide a real-time digital solution of the equations. This technique also significantly decreases the run time of nonreal-time digital simulations. The only assumption made in this technique is that the forcing functions of the differential equations are represented by linear segmented inputs during small time increments (time frames).

The availability of a simple, fast analytical solution of a linear second order differential equation for continuous inputs makes it possible to digitally simulate in real time any phenomena which can be described by a system of linear second order differential equations. This technique may also be applied to non-real-time digital simulations, which should result in considerable savings of digital computer time.

Note:

Documentation is available from:

Clearinghouse for Federal Scientific
and Technical Information
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No patent action is contemplated by NASA.

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