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Brief 71-10472

NASA TECH BRIEF

NASA Pasadena Office

Landing Dynamics Program for Impact Attenuating Vehicles (LANDIT)

The problem:

To predict the dynamic landing response characteristics of axisymmetric impact attenuating vehicles that consist of a rigid payload and a crushable impact limiter system.

The solution:

A digital computer program, LANDIT. The program has been used to successfully predict the impact response of a previously designed disc-type Mars prototype landing vehicle.

How it's done:

The program is based on the solution of a planar landing dynamics problem. The vehicular degrees-of-freedom consist of the horizontal and vertical displacements of the gravity center relative to the impact surface and the rotation of the vehicle about the center of gravity in the plane of the admissible displacements. The solution is developed by numerically solving a set of three nonlinear differential equations of motion.

LANDIT performs the computations and provides an output consisting of a set of vehicle CG displacement, velocity, and acceleration-time histories of the impact event. Continuous data regarding the magnitude of the crushing force and the amount of mechanical energy dissipated are also provided.

Although developed mainly as a design tool in the structural design of lunar or planetary hard-landing vehicles, the program may be utilized in any design area where energy dissipation is a consideration.

Notes:

1. This program is written in FORTRAN IV (87%) and MAP (13%) for use on the IBM-7094 computer.
2. Requests for further information may be directed to:

   COSMIC
   112 Barrow Hall
   University of Georgia
   Athens, Georgia 30601
   Reference: B71-10472

Patent status:

No patent action is contemplated by NASA.

Source: R.H. Patton and A.C. Knoell of
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