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NASA TECH BRIEF

Marshall Space Flight Center

Numerical Integration of Second Order Differential Equations

A numerical integration technique using a reduced-step function evaluation determines approximate solutions to second order differential equations. The technique may be useful in evaluating system performance, analyzing material characteristics, and designing inertial guidance and nuclear instrumentation and materials.

The performance characteristics of higher order approximations of the Runge-Kutta type are analyzed, and performance predictors for the time required on the machine and for the error size are developed. These predictors are not designed to give precise information; but supporting data shows that the information obtained provides a useful guide in solving the problem.

The predictors and data indicate that the formulas that should be used are Shanks' formulas of the sixth, seventh, and eighth orders.

Note:

Requests for further information should be directed to:

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Patent status:

No patent action is contemplated by NASA.

Source: E. B. Shanks of
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