ENGLISH SUMMARIES

A SERIES SOLUTION FOR THE PROJECTILE MOTION SUBJECT TO QUADRATIC AIR DRAG

Matti A Ranta
Raimo von Hertzen

Journal of Structural Mechanics, Vol. 34
No. 2, 2000, pp. 15-24

The quadratic air resistance law makes the analytical solution of the projectile motion impossible, and the natural way is to resort to numerical integration of the equations of motion. The article shows how it is possible to derive the solution without a step by step procedure of numerical integration. The magnitude function of the relative speed is solved approximately by the truncated MacLaurin-series. This procedure transforms the nonlinear vector differential equation of motion with constant coefficients into a linear vector differential equation with variable coefficients, the solution of which can be given in an integral form. Since the magnitude function is small and slowly varying, the exponential function in this form can be linearized and integrated analytically in a closed form. Comparison with the numerical solution, directly integrated by the NDSolve Build-in Mathematica Object, reveals a good compatibility as far as the ranges of less than two kilometers are considered. The series solution is significantly faster than the NDSolve-method and has a constant running time at all distances.

ON NUMERICAL ANALYSIS OF ELASTO-PLASTIC STRUCTURES

Sami Pajunen

Journal of Structural Mechanics, Vol. 34
No. 2, 2000, pp. 25-38

The paper presents a concise review of some computational techniques used in the elasto-plastic structural analysis. The paper is limited to the consideration of structures discretised with the finite element method and only to rate-independent material models. In addition with the derived computational algorithms, a numerical example is presented in order to illustrate the performance of some algorithms in an analysis of a stretched cylindrical shell.