# VIBRATION OF EDGE-CRACKED BEAM WITH VARIABLE CROSS SECTION USING DIFFERENTIAL QUADRATURE METHOD

**By**

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# ABSTRACT

Most engineering problems are governed by a set of partial differential equations (PDEs) with proper boundary conditions. In general, it is very difficult to obtain the closed-form solution of these equations. On the other hand, the solution of these PDEs is always demanded due to practical interests.

In this study, we have used an efficient discretization technique to obtain accurate numerical solutions using a considerably small number of grid points; it is the differential quadrature method.

Differential quadrature method had employed to formulate the discrete eigen-value problems of Euler-Bernoulli beam with variable cross section resting on elastic foundation with a single edge crack, axial loading, distributed load, excitation force and external moment. This study concerns the forced vibration of this beam. Appropriate boundary conditions were accompanied the differential quadrature method to transform the partial differential equation of Bernoulli-Euler beam with a single crack into a discrete eigen-value problem.

Results have been represented in both graphical and tabulated forms. These results show that the frequencies of this beam are affected by the change of location of the crack, depth of the crack, axial loading value, distributed load, excitation force value and external moment value together with the change in the elastic foundation properties.