
On the Existence of Periodic Solutions for a Certain Nonlinear Plate Dynamics Problem

M. MOFID[#] AND M. R. SHADNAM[†]

[#]*Civil Engineering Department, Sharif University of Technology, Tehran, Iran*

[†]*Civil Engineering Department, University of Alberta, Canada*

E-mail: [#]mofid@sharif.edu, [†]mshadnam@ualberta.ca

The sufficient condition for the existence of periodic solution for the second order nonlinear partial differential equation governing dynamics of a plate under large high speed moving mass is considered. Green functions are used to convert the equations into integral equations and a suitable Banach space is assumed to obtain the conditions.

The inertial effects of the moving mass is included in the analysis taking into account the absolute acceleration expansion. The dynamics of the system is nonlinear because of taking into account the middle plane stretching effect that causes large deformations.

The dynamic behavior of structures under influence of moving loads is a subject of considerable importance, and much attention had been given to the corresponding mathematical problem. The fundamental mathematical complexity encountered in this problem lies in the fact that one of the coefficients of operator describing the motion is a function of space and time. This is caused by the presence of a Dirac-delta function as a coefficient necessary for a proper description of motion.