

## Linear Dynamics of an Elastic Beam and Plate Under Moving Loads with Uncertain Parameters

Andrzej Pownuk

Department of Mathematical Sciences

The University of Texas at El Paso

<http://andrzej.pownuk.com>

Linear dynamics of an elastic beam under moving loads can be described by the following partial differential equation  $-EJ \frac{\partial^4 u}{\partial x^4} + q = \rho A \frac{\partial^2 u}{\partial t^2}$ . Dynamics of plates can be described by the following

equation  $-D \left( \frac{\partial^4 u}{\partial x^4} + 2 \frac{\partial^4 u}{\partial x^2 \partial y^2} + \frac{\partial^4 u}{\partial y^4} \right) + q = \rho A \frac{\partial^2 u}{\partial t^2}$ . In many cases load  $q$ , geometrical and

material parameters  $A, J, h, \rho$  may be uncertain. Presented approach allows to find not only set valued solution of presented equations but also appropriate combinations of parameters which correspond to the boundary of that solution. Such combinations can be used in the design process of engineering structures with uncertain parameters.