DSTA 2021
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16th INTERNATIONAL CONFERENCE
Dynamical Systems – Theory and Applications
December 6-9, 2021, On-line

Non-linear dynamics analysis of elastically supported beam under moving loads

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Abstract: In engineering practice we often come across the analysis of beams under moving loads, the beam design is largely and commonly used in modeling bridges, piles columns, railway track, and so on. Moreover, the design of beams based on elastic analysis is extremely likely to be conservative due to the unaccounted of geometric or material nonlinearities. As the common beam model which is highly used is the Euler-Bernoulli model, Bishop and Drucker [1] becoming the early study of the geometric nonlinearity in the E-B model, where an analytical solution was derived. Numerical schemes were also proposed to dealing with the problem can be viewed [2-4].
Especially in the field of dynamics of railway Bridge, as the beam deflections become larger, the generated geometric nonlinearities result in consequences that are not detected in linear systems. Concerning the corresponding nonlinear problem, very few papers have been published on this topic. In this paper the dynamic response of an elastically supported E-B beam constant cross-section undergoing moderate large deflections, traversed by moving loads is analyzed, the effects of the load speed, elastic stiffness on the dynamic response of the studied system is also investigated.

Keywords: nonlinearity, dynamic response, moving load, support elastic, resonance, bridge.

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