Parametrically excited vibration of a timoshenko beam on random viscoelastic foundation jected to a harmonic moving load

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The vibration response of a Timoshenko beam supported by a viscoelastic foundation with randomly distributed parameters along the beam length and jected to a harmonic moving load, is studied. By means of the first-order two-dimensional regular perturbation method and employing appropriate Green's functions, the dynamic response of the beam consisting of the mean and variance of the deflection and of the bending moment are obtained analytically in integral forms. Results of a field measurement for a test track are utilized to model the uncertainty of the foundation parameters. A frequency analysis is carried out and the effect of the load speed on the response is studied. It is found that the covariance functions of the stiffness and the loss factor both have the shape of an exponential function multiplied by a cosine function. Furthermore, it is shown that in each frequency response there is a peak value for the frequency, which changes inversely with the load speed. It is also found that the peak value of the mean and also standard deviation of the deflection and bending moment can be a decreasing or increasing function of the load speed depending on its frequency