

The Use Of The Forced Response Due To A Truck Fleet For Structural Health Monitoring Of Bridges

Kun FENG

The influence of traffic loads on the dynamic features of a bridge is an external factor that can hinder the true condition of the structure. If the interaction between vehicle and bridge is modelled using the finite element method, the response is based on mass, stiffness and damping matrixes of a coupled vehicle-bridge system that vary with the location of the load at each point in time. This paper compares time-varying forced frequencies of a beam bridge model due to a fleet of 3-axle trucks using eigenvalue analysis (i.e., derived from the matrixes of the coupled system) and dynamic transient analysis (i.e., derived from the frequency content of the acceleration response of the beam due to a truck crossing). Truck properties are randomly varied within a realistic range to obtain a mean pattern for the forced response due to a truck fleet. From these patterns in forced vibration, a trend is revealed that allows characterizing damaged bridges.