INVESTIGATION TO STUDY THE DYNAMIC BEHAVIOR OF RAILWAY CARRIAGE COMPONENTS MOVING ON CURVED TRACKS AT CRITICAL HUNTING VELOCITY

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Abstract

Railway carriage model moving on curved tracks is constructed by deriving the equations of motion concerning the model in which single-point and two-point wheel-rail contact is considered. The presented railway carriage model comprises of front and rear simple conventional bogies with two leading and trailing wheelets attached to each bogie. The railway carriage is modeled by 31 degrees of freedom which govern vertical displacement, lateral displacement, roll angle and yaw angle dynamic response of wheelset in addition pitch angle carbody and each of the two bogies. Combination of linear Kalker's theory and nonlinear Heuristic model is adopted to calculate the creep forces in which introduced at wheel and rail contact patch area. Computer aided-simulation is constructed to solve the governing differential equations of the mathematical model using Runge-Kutta fourth order method. Numerical simulation model is used to study the dynamic responses of the carbody and bogies of a railway carriage subjected to specific parameters of wheel conicity and primary suspension characteristics at critical hunting velocity. A comparison to study the sensitivity of railway carriage components is also presented at critical hunting velocity.