

Numerical Simulation of a Three-Dimensional Framework under the Action of Two-Dimensional Moving Loads

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Abstract : The objective of this research is to develop a general technique so that one may predict the dynamic behaviour of a three-dimensional scale crane model subjected to time-dependent moving point forces by means of conventional finite element computer packages. To this end, the whole scale crane model is divided into two parts: the stationary framework and the moving substructure. In such a case, the dynamic responses of a scale crane model can be predicted from the forced vibration responses of the stationary framework due to actions of the four time-dependent moving point forces induced by the moving substructure. Since the magnitudes and positions of the moving point forces are dependent on the relative positions between the trolley, moving substructure and the stationary framework, it can be found from the numerical results that the time histories for the moving speeds of the moving substructure and the trolley are the key factors affecting the dynamic responses of the scale crane model.

Keywords : moving load, moving substructure, dynamic responses, forced vibration responses

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