Simplified Evaluation Method for Running Safety of Railway Structures in consideration of Nonlinear Behavior

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In order to efficiently determine the weak points of the running safety in railway sections during large-scale earthquakes or existing structures with low yield seismic intensity, this paper proposed a simple evaluation method for running safety of railway vehicle during large scale earthquakes based on numerical simulations which quantified the degree of influence of nonlinear behavior of structures on the wheel derailment limit. The method can evaluate the occurrence of derailment only from the structural response such as the acceleration of the structure top and the angular rotation at the structural boundary. The vibration displacement and the differential displacement, which were conventionally verified independently, can be evaluated by a continuous function, which makes it possible to select effective countermeasures according to the weak point characteristics. The validity of the method was examined by comparing the derailment and the ground motion magnitude calculated by nonlinear dynamic interaction analysis of vehicles / structures.