Contribution ID: **966** Contribution code: **WED-PO2-510-11** Type: **Poster**

Vertical Dynamic Response of Vehicle-bridge Coupled Systems in Superconducting Electrodynamic Suspension Train

Wednesday, November 17, 2021 10:30 AM (20 minutes)

Elevated bridge is applied widely in maglev railway systems for high-speed ground passenger transportation. But the vibration of vehicle and bridge is essentially coupled with each other and there is a strong problem of vehicle-bridge coupled vibration. Therefore, it is necessary to investigate the vertical dynamic characteristics of superconducting electrodynamic suspension (EDS) train vehicle-bridge coupled systems, which is currently the only through 600 kilometers speed domain application feasibility of rail transit vehicles. Firstly, based on Fourier inverse transformation, the guideway irregularity time domain series are obtained by numerical simulation, which is used as external excitation input to the superconducting EDS train. Then the superconducting EDS train dynamic model is built in Simpack, which is viewed as a model considering rigid bridge. The bridge finite element model is built in ANSYS and the modal state of the bridge is calculated to form a modal file into Simpack, which is viewed as a model considering flexible bridge. At the same time, to verify the reliability of the vehicle-bridge coupled model, the 22 degree of freedom (DOF) vertical analytical dynamic model is established with the vehicle-bridge coupled based on the Euler-Bemoulli model in Matlab/Simulink. Meanwhile, vertical dynamic response of flexible bridge is developed and evaluated. Subsequently, the vertical displacement and acceleration of the superconducting EDS train considering flexible bridge and rigid bridge are compared at different speeds. The results show that the vertical vehicle-bridge coupled systems can get more accurate vertical vibration performance of EDS train; key dynamic indexs of the bridge meet the relevant requirement. These results can provide a useful reference for the further research and practical application of the superconducting EDS train.

Authors: FENG, Piji (Southwest Jiaotong University); ZENG, Jingsong (Southwest Jiaotong University); YAN, Zhaoying (Southwest Jiaotong University); ZHANG, Weihai (Southwest Jiaotong University); MA, Guangtong (Southwest Jiaotong University)

Presenter: FENG, Piji (Southwest Jiaotong University)

Session Classification: WED-PO2-510 Maglev and Levitation II