8th. World Congress on Computational Mechanics (WCCM8)
5th. European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2008)
June 30 – July 5, 2008
Venice, Italy

FINITE/INFINITE ELEMENT APPROACH FOR GROUND VIBRATIONS DUE TO UNDERGROUND TRAINS

***Y. B. Yang[1] and H. H. Hung[2]**

[1] Department of Civil Engineering
National Taiwan University
1 Roosevelt Road, Sec. 4, Taipei 10617, Taiwan
E-mail: ybyang@ntu.edu.tw

[2] National Center for Research on Earthquake Engineering (NCREE)
200, Sec. 3, Hsin-Hai Road, Taipei 106, Taiwan
E-mail: hhhung@ntu.edu.tw

Key Words: *Ground vibration, infinite element, moving load, soil vibration, soil-tunnel interaction, subway, tunnel.*

ABSTRACT

A brief review of the research works on ground vibrations caused by trains moving in underground tunnels is first given. Then, the finite/infinite element approach for simulating the soil-tunnel interaction system with semi-infinite domain is summarized. The tunnel is assumed to be embedded in a homogeneous half-space or stratified soil medium. The train moving underground is modeled as an infinite harmonic line load. Factors considered in the parametric studies include the soil stratum depth, damping ratio and shear modulus of the soil with or without tunnel, and the thickness of the tunnel lining. As far as ground vibration is concerned, the existence of a concrete tunnel may somewhat compensate for the loss due to excavation of the tunnel. For a soil stratum resting on a bedrock, the resonance peak and frequency of the ground vibrations caused by the underground load can be rather accurately predicted by ignoring the existence of the tunnel. Other important findings drawn from the parametric studies are given in the conclusion.

REFERENCES

[1] Y. B. Yang, H. H. Hung, and L. C. Hsu, "Ground vibrations due to underground trains considering soil-tunnel interactions", *Interaction & Multiscale Mech., an Int. J.*, Vol. **1**, No. 1, pp. 157-175, (2008).

[2] Y. B. Yang and H. H. Hung, *Wave Propagation for Train-Induced Vibrations - A finite/infinite element approach*, World Scientific, Singapore, 2008.

[3] Y. B. Yang and H. H. Hung, "Soil vibrations caused by underground moving trains, *J. of Geotech. & Geoenvironment. Eng.*, ASCE, to appear (2008).