Letter to the Editor

Response to comments on: "Vibration Suppression for High Speed Railway Bridges Using Tuned Mass Dampers" by J.F. Wang, C.C. Lin, and B.L. Chen [International Journal of Solids and Structures, Vol. 40, No. 2, pp. 465–491, 2003]

We would like to thank Professor Ping Lou for his interest and four comments on our paper entitled "Vibration Suppression for High Speed Railway Bridges Using Tuned Mass Dampers" (Wang et al., 2003). Our replies are in the following:

1. This comment is right. An obvious typing error appears in the expression of $H(t, t_k)$ at the third line of p. 470. A subscript "k" was lost. It should read as

   $$H(t, t_k) = U(t - t_k) - U[t - (t_k + v/L)]$$

2. We assume that the three train models have same total train mass m_v which includes the wheel mass m_w in the moving suspension mass model. Therefore, the wheel mass m_w was neglected in Eq. (5c) and the comparison of model accuracy is then meaningful.

3. This comment is correct. The discuser illustrated a more sophisticated equation of motion considering the effect of train speed on the time-variation of system parameters and dynamic characteristics of the train-bridge combined system, as given by Frýba (1996). Since our paper mainly deals with the control effectiveness of tuned mass damper in suppressing the train-induced vibrations, without loss of accuracy, a simple model (Akin and Mofid, 1989; Green and Cebon, 1997) was employed to illustrate the detuning effect (in Section 5.2) due to the variation of system dynamic characteristics. For the calculation of train and bridge responses (in Section 5), a half-train model (Fig. 10) rather than the moving mass model was employed. We used finite element method and iterative procedure which were well known approaches to calculate the dynamic responses of bridge and train. The train speed effect has been considered implicitly. Even though the wheels are moving masses, the train-speed effect can also be neglected because the wheel masses are relatively small compared with the total mass of the train-bridge combined system.

4. The discuser shows the derivations and expressions of the interaction force, which has been taken into account in the half-train model, between wheel set and bridge. To consider the size and main subject of the paper, we did not illustrate its detailed formulation. However, we agree that with this formulation, the paper will become more readable.

References

Akin, J.E., Mofid, M., 1989. Numerical solution for response of beams with moving mass. Journal of Structural Engineering, ASCE 115 (1), 120–131.

Frýba, L., 1996. Dynamic of Railway Bridges. Thomas Telford, London.

Green, M.F., Cebon, D., 1997. Dynamic interaction between heavy vehicles and highway bridges. Computers & Structures 62 (2), 253–264.

Wang, J.F., Lin, C.C., Chen, B.L., 2003. Vibration suppression for high-speed railway bridges using tuned mass dampers. International Journal of Solids and Structures 40 (2), 465–491.

Professor Chi-Chang Lin
Department of Civil Engineering
National Chung Hsing University
Taichung, Taiwan, ROC
Tel.: +886 4 22840430x301
E-mail address: cclin3@dragon.nchu.edu.tw

Available online 7 April 2005