

# Dynamic response of footbridges with tuned mass dampers

Jiří Máca<sup>1</sup>

<sup>1</sup>Czech Technical University in Prague, Faculty of Civil Engineering, Department of Mechanics, Thákurova 7, Praha 6, CZ-166 29, Czech Republic

E-mail: maca@fsv.cvut.cz

**Abstract.** The increase of vibration problems in modern footbridges shows that footbridges should no longer be designed for static loads only. Not only natural frequencies but also damping properties and pedestrian loading determine the dynamic response of footbridges and design tools should consider all of these factors. Footbridge vibrations don't cause usually structural problems, but if the vibration behaviour does not satisfy the comfort criteria, changes in the design or damping devices could be considered. The most popular external damping devices are viscous dampers and tuned mass dampers (TMD). The paper presents the basic principles of optimal TMD configuration and design procedure. The efficiency of TMD is demonstrated on the example of a footbridge prone to vibrations induced by pedestrians. It is shown that if the TMD is tuned quite precisely the reduction of accelerations can be very significant.