Development Of Mobile Testing And Computer Vision-Based Technologies For Rapid Dynamic Identification Of Bridges

Yongding TIAN

Bridge deterioration usually happens and even collapses under the coupling effects of environmental loads and materials degradation, therefore, how to rapidly evaluate the in-service condition of bridges is a national demand. Traditional testing methods have the limitation of low-efficiency and conventional data mining results are difficult to support the condition assessment of bridges. This paper proposes to develop mobile testing and computer vision-based technologies for rapid condition monitoring and dynamic identification of numerous bridges in road networks. Specifically, (1) three mobile testing techniques including mobile impact testing, mass-changing strategy and moving mass technique will be presented, from which structural scaling factor, mass-normalized mode shapes and modal flexibility can be identified and they are useful for bridge reliability evaluation; (2) various computer vision-based technologies have developed to measure multi-point static/dynamic displacements, pedestrian-induced impacting forces and cable tension forces of bridges. The developed bridge rapid testing technology and corresponding dynamic identification methods have been applied to Nansha suspension bridge, Sutong Yangtze river bridge and Humen suspension bridge, verifying the effectiveness and robustness of the developed technologies.