



BRIDGE DEFLECTION MEASUREMENT USING WIRELESS MEMS INCLINATION SENSOR SYSTEMS

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Abstract- Bridge is an important part of modern transportation systems and deflection is an important index for bridge's safety evaluation. In this paper, a method of deflection measurement using Wireless MEMS Inclination Sensor Systems (WMISS) is presented and validated. Firstly, based on various bridge deflection measuring methods, the method of deflection measurement using inclination parameter is introduced. Secondly, a low-power wireless inclination sensor based on 3D-MEMS SCA60 inclinometer is designed using modularization way, and this kind of wireless sensor loaded with ZigBee/IEEE 802.15.4 MAC protocol stack can self-organize wireless sensor network, measure the angle value and send the data to the coordinator. Then the deflection curve is displayed on PC. Finally, deflection measurement experiments are conducted on a bridge model and Beida Bridge. The experimental results show that, the presented deflection measurement

method is feasible, practical and reliable; the wireless inclination sensor is easy to operate with no lines, and has extensive and broad application prospects.

Index terms: wireless sensor networks, MEMS, deflection measurement, inclination, bridge