

Special Issue on Sensing and Monitoring for Infrastructure

Preface



The main theme of this special issue is research on sensors and monitoring systems that are being developed for the evaluation of civil infrastructure, and in particular for determining the soundness of bridges. Recent information and communication technology (ICT) advances have opened up possibilities for sensing, monitoring, and damage detection that were unimaginable in the past, leading to significant improvements in the ability to evaluate the soundness of infrastructure and predict its deterioration. This is expected to both reduce maintenance costs and improve safety and reliability.

The 1960s and 1970s were periods of intensive infrastructural development in Japan. At present, about 20% of bridges were built 50 or more years ago, and this percentage will increase to about 44% in 10 years time. Over time, fatigue and corrosion occur in steel structures, and concrete is subject to neutralization and deterioration processes such as alkali-silica reactions. It is therefore becoming increasingly important to monitor the soundness of structures, in a similar manner to the way physicians monitor the human body.

At present, an inspection scheme for highway structures is in use, based on a unified set of indicators. The results have already indicated that urgent or early measures are necessary for about 10% of the 730,000 bridges. Care for deteriorating structures is similar to human healthcare, in that early detection and corrective measures are important. It is essential to be able to judge whether a deteriorating structure should be completely replaced, or whether rehabilitation in the form of repair or retrofitting is sufficient.

Recent advances in ICT are expected to lead to drastic improvements in the maintenance and management of civil infrastructure.

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