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Monitoring of the Condition of Structures
2.5.1 Assessment of Individual Objects2.5.2 Periodic Monitoring; 2.5.3 BRIMOS® Recorder; 2.5.4 Permanent Monitoring; 2.5.5 Subsequent Measures; 2.6 Application of Ambient Vibration Testing to Structures for Railways; 2.6.1 Sleepers; 2.6.2 Noise and Vibration Problems; 2.7 Limitations; 2.7.1 Limits of Measuring Technology; 2.7.2 Limits of Application; 2.7.3 Limits of Analysis; 2.7.4 Perspectives; References; 3 FEEDBACK FROM MONITORING TO BRIDGE DESIGN; 3.1 Economic Background; 3.2 Lessons Learned; 3.2.1 Conservative Design; 3.2.2 External versus Internal Pre-stressing
3.2.3 Influence of Temperature3.2.4 Displacement; 3.2.5 Large Bridges versus Small Bridges; 3.2.6 Vibration Intensities; 3.2.7 Damping Values of New Composite Bridges; 3.2.8 Value of Patterns; 3.2.9 Understanding of Behaviour; 3.2.10 Dynamic Factors; References; 4 PRACTICAL MEASURING METHODS; 4.1 Execution of Measuring; 4.1.1 Test Planning; 4.1.2 Levelling of the Sensors; 4.1.3 Measuring the Structure; 4.2 Dynamic Analysis; 4.2.1 Calculation Models; 4.2.2 State of the Art; 4.3 Measuring System; 4.3.1 BRIMOS®; 4.3.2 Sensors; 4.3.3 Data-Logger; 4.3.4 Additional Measuring Devices and Methods
4.4 Environmental Influence4.5 Calibration and Reliability; 4.6 Remaining Operational Lifetime; 4.6.1 Rainflow Algorithm; 4.6.2 Calculation of Stresses by FEM; 4.6.3 S-N Approach and Damage Accumulation; 4.6.4 Remaining Service Lifetime by Means of Existing Traffic Data and Additional Forward and Backward Extrapolation; 4.6.5 Conclusions and Future Work; References; 5 PRACTICAL EVALUATION METHODS; 5.1 Plausibility of Raw Data; 5.2 AVM Analysis; 5.2.1 Recording; 5.2.2 Data Reduction; 5.2.3 Data Selection; 5.2.4 Frequency Analysis, ANPSD (Averaged Normalized Power Spectral Density)
5.2.5 Mode Shapes

Sommario/riassunto

In-operation vibration monitoring for complex mechanical structures and rotating machines is of key importance in many industrial areas such as aeronautics (wings and other structures subject to strength), automobile (gearbox mounting with a sports car body), rail transportation, power engineering (rotating machines, core and pipes of nuclear power plants), and civil engineering (large buildings subject to hurricanes or earthquakes, bridges, dams, offshore structures). Tools for the detection and the diagnosis of small changes in vibratory characteristics are particularly useful to set up a pr

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Sommario/riassunto	This open access book reports on methods and technologies to describe, evaluate and control uncertainty in mechanical engineering applications. It brings together contributions by engineers, mathematicians and legal experts, offering a multidisciplinary perspective on the main issues affecting uncertainty throughout the complete system lifetime, which includes process and product planning, development, production and usage. The book is based on the proceedings of the 4th International Conference on Uncertainty in Mechanical Engineering (ICUME 2021), organized by the Collaborative Research Center (CRC) 805 of the TU Darmstadt, and held online on June 7–8, 2021. All in all, it offers a timely resource for researchers,

graduate students and practitioners in the field of mechanical engineering, production engineering and engineering optimization.