Editorial

Vibration-Based Damage Identification and Condition Monitoring in Mechanical Structures and Components

Rafał Burdzik ¹, Maosen Cao ², Andrzej Katunin,³ and Sandris Ručevskis ⁴

¹Silesian University of Technology, Katowice, Poland

²Hohai University, Nanjing, China

³Silesian University of Technology, Gliwice, Poland

⁴Riga Technical University, Riga, Latvia

Correspondence should be addressed to Rafał Burdzik; rafal.burdzik@polsl.pl

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Damage detection and identification as well as continuous condition monitoring are one of the most important issues related to proper operation of machines and structural parts in order to ensure their structural integrity, safety, and desirable operational properties. In recent years, an exponential development of vibration-based methods for damage detection and identification as well as condition monitoring used for machines and structures has been observed. This development was possible for two main reasons: the advance of apparatus and measurement techniques in vibration engineering and the development of advanced mathematical tools for signal conditioning and postprocessing. Both of these reasons influence modern trends related to vibration-based damage identification and condition monitoring in mechanical structures and components. This special issue is focused on recent attempts in development of vibration-based damage identification in mechanical structures and also homogeneous and inhomogeneous structures, especially stressing the latter such as advanced composites, and related issues connected with modal analysis and structural dynamic analysis. Moreover, the special issue covers damage identification and monitoring topics related to theoretical studies and numerical simulations as well as practical solutions, in particular in rotary machinery and vibration-generating devices, structural elements of heavy machinery and vehicles, etc. Thus, this special issue collects interdisciplinary approaches on vibration-based damage identification and condition monitoring, and it can be good motivation to consider and develop some innovative directions of research.

All the trends and innovations in vibration-based damage identification and condition monitoring have attracted the attention to this special issue from the international researchers and scientists. This special issue has attracted 40 submissions from authors from all around the world; only 19 papers have been selected and included in this special issue on shock and vibration and vibration-based damage identification and condition monitoring in mechanical structures and components. The selection of the high-level papers was conducted as a rigorous peer-review process by the international, well-recognized experts in the appropriate fields presented in each paper. Thus, each manuscript has been evaluated as single, original work with the comparison with current state of art. The editors of the special issue would like to thank all authors of all submitted articles. More of the submitted papers were interesting and present original research. The first selection consisted in assessing compliance with the topic of special issue. The second stage of evaluation was based on originality and quality of the paper. The last editorial stage selected best papers to present wide range of research on vibration-based damage identification and condition monitoring in mechanical structures and components. Thus, even good papers could be rejected to ensure presentation of different areas.

The papers collected in this special issue focus on such topics as incident Love wave propagation, which interacts with the cavity-generating forward-scattered and back-scattered surface wave, vibration-based damage identification and condition monitoring of metro trains, detection of delamination in laminate wind turbine blades using

one-dimensional wavelet analysis of modal responses, study on coupling faults characteristics of fixed-axis gear crack and planetary gear wear, planetary gearbox fault diagnosis via torsional vibration signal, diagnosis of localized faults in multistage gearboxes, weak fault feature extraction method, fatigue accumulative damage of a cross shield tunnel structure under vibration load, novel faults diagnosis method for rolling element, integrated cumulative transformation and feature fusion approach for bearing degradation prognostics, early warning method for dual-rotor equipment under time-varying operating conditions, acoustic emission monitoring and failure precursors of sandstone samples, optimal sensor placement for spatial structure based on importance coefficient and randomness, alpha-stable distributed processes and its application to diagnostics of local damage, and non-penetrating damage identification using hybrid lamb wave modes from the Hilbert–Huang spectrum in thin-walled structures. Selected papers present application of vibration (and acoustics)-based diagnostic and monitoring methods for different mechanical structures and materials. Other criteria of selection were to present novel approach and possibilities in signal processing and original research on application of new mathematical methods for the purpose of damage identification or structural health monitoring. Therefore, this special issue presents different approaches in vibration-based diagnostics, and it can indicate new areas or new application for further research.

Conflicts of Interest

The editors declare that they have no conflicts of interest.

Rafał Burdzik
Maosen Cao
Andrzej Katunin
Sandris Ručevskis