

Special Issue on Vibration-Based Health Monitoring of Mechanical Systems

CALL FOR PAPERS

Many industrial components, ranging from industrial machines to automotive applications and so forth, are subjected to cumulative damage phenomena often associated with cyclic loads. These are often caused by vibrations, occasional shocks, and acoustic emissions. In a damage tolerant (DT) scenario, each mechanical component needs to retain its residual health, safety, and functionality for as long as possible in order to avoid maintenance interventions that are expensive or simply difficult to perform. However, this requires extensive knowledge of the damage/wear state, and in several applications being able to identify the presence of a defect in time can be challenging. This is a general problem affecting not only pure mechanical components, but also a lot of different mechatronic subsystems that are integrated in the machine in order to obtain desired functionalities. These mechanical and mechatronic systems are currently monitored during both scheduled and unscheduled maintenance, by means of nondestructive inspection technologies (NDIs); however, in recent years the problem of real-time monitoring of mechanically stressed components has become a critical research topic.

As an example, many different sensing technologies can be exploited in a structural health monitoring (SHM) scenario, based on either local or distributed sensor networks that can deal with data coming from heterogeneous sources that are properly conditioned for the correct evaluation of the observed phenomena. In particular, distributed sensor networks are especially suited to monitoring not only large mechanical systems, but also fleets of different components particularly for vehicle or mobile applications. Resources involved in a complete experimental identification of relations between applied loads, environmental conditions, and the corresponding degradation of the tested system are often expensive and time consuming. In particular, this last aspect is becoming of fundamental importance due to market specifications that often constrain the final development of the tested component, system, or more generally the product.

The aim of this special issue is to collect original research and review articles describing theoretical findings as well as new experimental results related to vibration-based health monitoring of mechanical systems. The research should be industry-oriented and intended to improve the state-of-the-art. Requirements and constraints of the specific applications should be considered, and the results of the research must clearly demonstrate enhancements compared to other traditional techniques.

Potential topics include but are not limited to the following:

- ▶ Optimization of the sensing layout (with focus on noise, vibration, and harshness (NVH) measurements)
- ▶ Advanced modeling techniques able to provide relevant information for design, verification, and validation of the monitoring system within the observed component or structure
- ▶ Advanced signal conditioning techniques (with focus on vibration measurements and signal processing) to detect the presence of damage and evaluate its progression
- ▶ Advanced calibration, validation, and verification methods
- ▶ Innovative applications and technologies in the field of shock and vibration analysis

Authors can submit their manuscripts through the Manuscript Tracking System at <https://mts.hindawi.com/submit/journals/sv/hmos/>.

Papers are published upon acceptance, regardless of the Special Issue publication date.

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