Preface

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Effective management of an engineering asset involves obtaining accurate information about its current state of health as well as predicting its future health conditions and thus its remaining useful life. It also involves scheduling optimised maintenance and logistics activities to prevent unexpected failures, so as to reduce operation and maintenance costs. Through tremendous research efforts recently invested in the field of condition monitoring, prognostics, and condition-based maintenance optimisation, great progress has been made. Methods and tools in this field have been adopted, or have been studied and tested, in various industries including energy, aerospace, oil and gas, and manufacturing.

The aim of this special issue is to present new methods and tools in the area of condition monitoring and maintenance management. Six papers are included, with two focusing on equipment condition monitoring and prognosis. The first paper by Tse and Tse presents a method for low-cost and effective automobile engine fault diagnosis using instantaneous angular velocity evaluation and low-cost sensors. This method has the potential to prevent accidents by providing early warnings. The second paper by Lim and Mba proposes switching Kalman filters-based methods for condition monitoring and remaining useful life prediction. The approach does not depend on fixed thresholds for fault detection and can model different evolving degradation processes.

The other four papers in this special issue focus on maintenance management. Pandey and Zuo's paper discusses selective maintenance approaches considering two different types of failure modes, where only a subset of maintenance actions can be selected from the available maintenance options and an imperfect maintenance model is presented. Ding, Tian and Amayri's studies on condition-based maintenance of wind power generation systems consider different types of wind turbines on a wind farm as well as different lead times for different turbine components, which is more realistic. Dohi's research results on availability and performability analysis for a service degradation process are divided into two parts. Part I focuses on formulation and optimisation while Part II covers estimation and simulation. Two rejuvenation strategies, namely, reconfiguration of applications as a corrective maintenance action and reinstallation of an operating system as a preventive maintenance action, are incorporated in Dohi's model.

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