

HOW HYBRID THERMAL MODEL CAN TAKE UP THE CHALLENGES OF USING TEMPERATURE FOR FAULT DETECTION IN GEARED SYSTEMS

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ABSTRACT

In recent years, environmental concerns have pushed the industry to improve both efficiency and reliability of geared systems. In order to deal with reliability issues, health monitoring can be a relevant solution as it allows optimising maintenance and reduce downtime. To do so, analysing temperatures drift can be a cost-effective solution.

Yet, analysing multiple temperatures, measured on a geared system, in order to detect fault can be challenging. Indeed, temperatures are very sensitives to changes in operating conditions or to the environment of the considered device.

Studies [1] show that the use of a model is necessary in order to reliably detect faults in geared systems.

The proposed hybrid thermal model consists in integrating data driven approach in a physic based nodal model [2] in order to determine some physical parameters that are complex to identify accurately. This approach shown that model accuracy can be significantly improved compared to the nodal approach alone [3].

Recent investigation focussed on both a lab geared system, the FZG test rig, and a gearbox from an industrial handling system, both presenting various kinds of defects.

The improved accuracy of the hybrid model allows detecting the considered defects in both studied geared systems by analysing temperature variations between models and devices measurements.

Furthermore, the analysis of the drift in model parameters can be a good indicator in order to identify fault localisation. In the future, it could even be possible to evaluate fault magnitude based only on temperatures measurements variations.

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