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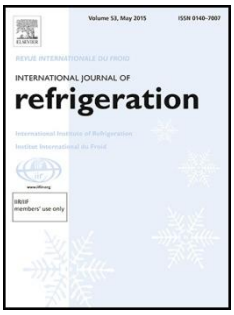

Title: A comparison of static and dynamic fault detection techniques for transcritical refrigeration

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A Comparison of Static and Dynamic Fault Detection Techniques for Transcritical Refrigeration

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HIGHLIGHTS

- Presents static fault detection and diagnosis (FDD) method for transcritical cycles.
- Experimental results confirm method efficacy for single and multiple faults.
- The benefits of dynamic FDD are assessed through simulation and experiment.

ABSTRACT

Repairing faults in heating, ventilation, air conditioning, and refrigeration (HVAC&R) systems can improve overall system energy efficiency and prevent leaked refrigerant, thereby generating substantial economic and environmental benefits. In this paper, static and dynamic fault detection and diagnosis (FDD) metrics are examined for both sub-critical and transcritical refrigeration cycles, with particular emphasis on transcritical cycles. Virtual sensors based on measurements from low-cost sensors are used to identify faulty behaviour. The paper demonstrates in simulation and experiment that current low-cost, static FDD techniques are capable of detecting multiple soft faults, even in the presence of secondary system faults. These