

DocumentID	241313
Vortragstitel	Leakage Diagnosis for Electric Motor Pumps in Aircraft Hydraulic Systems
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Preisträger	
Vortragssprache	englisch
Seiten	7
Veranstaltung	Deutscher Luft- und Raumfahrtkongress 2011
Veranstaltungsort	Bremen
Veröffentlicht in	Deutscher Luft- und Raumfahrtkongress, Tagungsband - Manuskripte, 2011; Seite 647 - 654; DGLR e.V.; Bonn; 2011
Stichwörter	Hydraulik Fehlerdiagnose
Abstract	<p>In the present paper, the effect of internal leakages of an aircraft hydraulic system's electric motor pump is investigated model-based. This investigation is performed in the context of the development of a fault diagnosis system for aircraft hydraulic power distributions systems. For that reason, a detailed physics-based model of the pump is developed in AMESim. This allows simulating the effect of the deterioration of specific components of the pump. Based on the model, it is analysed how the individual faults of the pump components that lead to internal leakages affect the overall pump performance. For this, the pump characteristic line is considered. It is shown that the pump characteristic line can be used to diagnose the extent of internal leakages. A concept for a robust and cost-efficient on-board diagnosis system is presented. In this context, sensor implementation aspects are discussed as well as the operating points of the pump, which are required for the diagnosis of the pump's internal leakages.</p>