Accepted Manuscript

Aircraft Engine Health Prognostics Based on Logistic Regression with Penalization Regularization and State-Space-Based Degradation Framework

Jianbo Yu

PII: S1270-9638(16)30586-7
DOI: http://dx.doi.org/10.1016/j.ast.2017.05.030
Reference: AESCTE 4043

To appear in: *Aerospace Science and Technology*

Received date: 4 September 2016
Revised date: 8 April 2017
Accepted date: 23 May 2017

Please cite this article in press as: J. Yu, Aircraft Engine Health Prognostics Based on Logistic Regression with Penalization Regularization and State-Space-Based Degradation Framework, *Aerosp. Sci. Technol.* (2017), http://dx.doi.org/10.1016/j.ast.2017.05.030

Aircraft Engine Health Prognostics Based on Logistic Regression with Penalization Regularization and State-Space-Based Degradation Framework

Jianbo Yu

School of Mechanical Engineering, Tongji University, Shanghai, 201804 P.R. China

jianboyu.bob@gmail.com

***Abstract*:** Engine health prognostics is critical to ensure reliability and safety of aircraft operations due to the provision of various health decision information. In this studying, a prognostics system is developed based on logistic regression (LR) and state-space-model (SSM) for engine health assessment and prediction. In this system, a health indicator based on logistic probability (LP) inferred from a variable set of sensor signals selected by LR with penalization regularization (LRPR) is used to characterize engine health states. LP is capable of offering a failure probability for the monitored engine, which has **intuitive** explanation related to its health state. A data-model-fusion method is developed for the engine health prognostics task accomplished by integration of LR and particle filtering (PF). Bayesian state estimations, on the basis of the engine health changes modeled by a baseline LR, are implemented to sequentially update the current health state and then to predict the future health propagation of engines. The prognostics system is applied to a gas turbine on the Commercial Modular Aero-Propulsion System Simulation (C-MAPSS) test-bed developed by NASA. The experimental results indicate the potential applications of the proposed system as an effective tool for engine health prognostics.

***Keywords*:** engine health prognostics, remaining useful life, logistic regression, penalization regularization, state-space-model, particle filtering.