Identifiant de la contribution : **201** Type : **non spécifié**

”DATA1#5 - Airplane turbulence detection with hybrid deep learning model”

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Atmospheric turbulence has a significant impact on airplane motions and can induce excessive stress and fatigue damage. The identification of turbulence in aircraft service phase is of particular interest to estimate actual structural fatigue or to define an improved maintenance plan. This article describes a new model to detect turbulence from in-board instrumentation solely. Equations expressing the relationship between the load factors in the 3 directions and the forces applied to the airplane are derived from a rigid body 6 degrees of freedom model. Lift, drag and lateral force coefficients, required to compute the aerodynamic forces, are predicted by multi layer perceptrons. The architecture of the model makes it possible to train the multi layer perceptrons in an unsupervised way with common deep learning techniques, using only sensors commonly present on airplanes. After the training phase, the model is able to predict the lift, drag and lateral force coefficients for various configurations. The error between the measured load factors and the load factors predicted by the model is used to identify the presence of turbulence. The performances of the model to predict the lift and drag coefficient is first evaluated on simulated data. The turbulence detection is then evaluated on a dataset composed of hundreds of commercial flights as well as on simulated data.

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