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## Innovative Methods to Estimate Rotorcraft Gross Weight and Center of Gravity

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This paper presents the initial developments of a hybrid model for estimating a rotorcraft's Gross Weight (GW) and Center of Gravity (CG) which combines different models for different flight regimes in order to increase the accuracy of the estimates. The model will combine flight dynamics based models with data-driven models using a Kalman Filter (KF) - Neural Network (NN) framework.

A GW model based on the main rotor thrust during steady state motion is described. The operating condition of the rotor is determined by force and moment equilibrium of the entire helicopter, therefore the thrust values calculated from trim conditions can be used to estimate GW. A second model, described here and which will be incorporated in the hybrid approach, is based on NN. Data recorded by the Health and Usage Monitoring Systems (HUMS) onboard CH-53E rotorcraft is used in order to estimate GW at the first hover. Future developments are presented at the end of the paper.

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**Ключевые слова:**

### Содержание

Abstract

Introduction

Models for gross weight estimation