The Pennsylvania State University

The Graduate School

# **Unsteady Dynamics Modeling of Helicopters**

**Project 3**

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Contents

[**Unsteady Dynamics Modeling of Helicopters** 1](#_Toc101622797)

[Introduction: 3](#_Toc101622798)

## Introduction:

Unsteady aerodynamics is a change of the forcing over a period. Here the hysteresis effects of the blade become increasingly important, hence the reason previously simple wake calculations or inflow calculations are not accurately representing the complete physics. Think such as higher harmonics or flutter on the dynamics structure often led to the total equation of motion to be changed significantly and cause multiple issues. These issues are often very critical with little damping natural which is why accurate calculations are required. These higher-order calculations are meant to allow for the future design choices for the aircraft that is not heavier than needed, all the while having sufficient damping and structure to be able to withstand these aerodynamic forces.

## Objective:

For the third project my goal was to create a code that could use Beddoes code for unsteady aerodynamics but does not account for compressibility. Another primary assumption of this code is that it assumes trim using the same parameters but utilizes only up to the fifth harmonic for the collective pitch. Initially the code from the wake calculations goes into the

## Technical Approach

## Results

## Conclusion