# Assignment 1

# BEM Wind Turbine

Carlos Espinós Garcia
Niklas Perujo
Bernat Serra Zueras

**Rotor and Wake Aerodynamics**

TU Delft

# Contents


**1 Introduction** **1**
- 1.1 Assignment BEM BERNAT . . . 1
- 1.2 Single polar innacuraciesBERNAT . . . 1

**2 Blade Element Momentum theory** **3**
- 2.1 Main assumptions of the BEM theory NIKLAS . . . 3
- 2.2 Code flow chart CARLOS . . . 3

**3 Results** **5**
- 3.1 BEM alligned rotor BERNAT . . . 5
  - 3.1.1 Main outputs BERNAT . . . 5
- 3.2 BEM yawed rotor NIKLAS . . . 5
  - 3.2.1 Main outputs NIKLAS . . . 5
- 3.3 Influence of tip correction CARLOS . . . 5
- 3.4 Influence of numerical discretization BERNAT . . . 5
- 3.5 Evaluation of stagnation enthalpy CARLOS . . . 5
- 3.6 System circulation and vorticity CARLOS . . . 5
- 3.7 Operational point NIKLAS . . . 5

**4 Optional** **7**
- 4.1 Explanation of the design approach used for maximizing the Cp or efficiency . . . 7
- 4.2 Plots with explanation of the new designs. . . . 7

**5 Conclusions NIKLAS** **9**

**Bibliography** **11**

# 1

# Introduction

## 1.1. Assignment BEM BERNAT

Blabla

## 1.2. Single polar innacuraciesBERNAT

Chowchow

# 2

# Blade Element Momentum theory

## 2.1. Main assumptions of the BEM theory NIKLAS

Perujo

## 2.2. Code flow chart CARLOS

CS7. Carlos Simao 7, ô magnifico

# 3

# Results

Describe the initial conditions, table, cool

## 3.1. BEM alligned rotor BERNAT

### 3.1.1. Main outputs BERNAT

Angle of attack and inflow angle BERNAT
Axial and azimuthal inductions BERNAT
Thrust and azimuthal loading BERNAT
Total thrust and torque BERNAT

## 3.2. BEM yawed rotor NIKLAS

### 3.2.1. Main outputs NIKLAS

Angle of attack and inflow angle NIKLAS
Axial and azimuthal inductions NIKLAS
Thrust and azimuthal loading NIKLAS
Total thrust and torque NIKLAS

## 3.3. Influence of tip correction CARLOS

## 3.4. Influence of numerical discretization BERNAT

## 3.5. Evaluation of stagnation enthalpy CARLOS

## 3.6. System circulation and vorticity CARLOS

## 3.7. Operational point NIKLAS

# 4

# Optional

## 4.1. Explanation of the design approach used for maximizing the Cp or efficiency

Blabla

## 4.2. Plots with explanation of the new designs

Rick Sanchez

# 5

# Conclusions NIKLAS

SHORT discussion/conclusion, including the similarities and differences between the two rotor configurations (yaw vs. aligned rotor ), flow field and operation

# Bibliography