ME 572 –AEODYNAMIC DESIGN
WITH DR. GOUSHCHA
FINAL REPORT
Due December 16, 2020 by 9pm

The objective of the assignment is to write a detailed report explaining the paper-design of the propeller used to power a hovercraft drone based on the mission requirements listed below. Your report should include at least the items listed below.
There is **absolutely no collaboration** on this assignment with your classmates. Email me if you have questions. All work, including **images should be unique and computer-generated by you**. Any similarities in reports will be **severely punished**. A roughly 4-page report is expected excluding figures (font size 10).

Mission requirement:

- Drone weight is $90N$
- Maximum vertical speed capability of $1m/s$
- Flight at sea level standard atmosphere
- Maximum motor speed is *2500 rpm*

Include *at least* the following in your report:

- Detailed explanation of all the items listed below in a narrative format
- Brief summary of the equations used in the calculation. Include image of the airfoil indicating all velocity components and the angles relevant in the calculation. (This image needs to be computer-generated by you)
- Brief summary of the iterative process used to converge the solution
- Table indicating final values for
    - Rotor disk diameter (Blade length $\times$ 2)
    - Airfoil name
    - Chord length
    - Number of blades. Cannot be more than 16. Blades cannot overlap.
    - Propeller rotation speed at maximum vertical ascent speed
- A plot showing airfoil setting angle as a function of local radius. *Splitting each blade into 5 sections is sufficient.*
- A sample calculation, showing at least three calculations by hand used to converge your iterations
- A table showing outputs for each iteration for
    - Iteration number
    - Value of v_i
    - Value of dT computed using aerodynamics
    - Value of dT computed using momentum conservation
- Indicate the induced velocity v_i at hover flight condition
- MATLAB code used in your calculations. Attach this as an appendix, does not count towards 4-page limit.