Experimental Turbine Geometry:

Blade chord: c = 4.06 cm

Radius to the quarter chord mounting point: R\_c/4 = 8.23 cm

Outermost Diameter: D = 17.2 cm

Blade Span length: S = 23.4 cm

Turbine Area: A = 402.48 cm^2

Freestream Velocity: Uinf = 0.885 m/s

c/R = 0.49

Re\_c = 44,000

For further details see associated TEAMER Report

**Intracycle:**

* Performance Data: all 2 bladed data
  + Structure
    - All of the performance data is compiled into .mat structures of data with prefix “Perf\_”
    - Simulation vs experimental data is denoted by “\_RANS” or “\_Exp” respectively in the filename.
    - The performance data is further broken up into individual files for each intracycle kinematic and into phase averaged (\_PhaseAvg) and time averaged (\_TimeAvg) performance files.
    - One additional file “HEATMAP” contains all of the intracycle kinematics tested and resulting efficiency
  + Variables
    - Phase averaged data files
      * **theta:** angular position in [deg]. Defines the coordinate system such that 0 occurs the blade angular velocity vector is pointing directly upstream, and 180 when traveling in the streamwise direction.
      * **time:** [nondimentionalized by the period thus range is from 0-1], normalized time allows plotting as a function of time which accounts for the reduced amount of time spend in phases of higher velocity.
      * **Cp**: [nondimentional] Power coefficient as a function of position (theta), support and inertial effects subtracted off
      * **CForce**: [nondimentional] Force coefficient as a function of position (theta) support losses present
      * **CThrust**: [nondimentional] Thrust force coefficient as a function of position (theta) support losses present
      * **CLat**: [nondimentional] Lateral force coefficient as a function of position (theta) support losses present
      * **TSR**: [nondimentional] tip-speed ratio as a function of position (theta)
    - Time-averaged data files
      * **Cp\_TA**: [nondimentional] time average power coefficient, support losses removed
      * **CForce\_TA:** [nondimentional] time average in plane force coefficient, support losses present
      * **CThrust\_TA:** [nondimentional] time average lateral force coefficient, support losses present
      * **CLat\_TA:** [nondimentional] time average in plane lateral forcecoefficient, support losses present
      * **TSR\_TA:** [nondimentional] time averaged tipspeed ratio->decreases with increasing amplitude due to the reduced time spent at phases of high speed
    - HEATMAP data file
      * **Amp:** [nondimentional by constant rotation rate] vector of amplitudes of sinusoidal velocity fluctuation with 0 amplitude corresponding to the constant speed case.
      * **Phi:** [degree] vector of phase shifts
      * **Cp**: [nondimentional] matrix of time average power coefficient, support losses removed
* Flowfields:
  + See “flowfields\_readme” for variables, coordinate system, non-dimentionalization and structure

**Camber:**

* Performance Data: all 1 bladed data
  + Structure
    - All of the performance data is compiled into .mat structures of data with the prefix “Perf\_”
    - Simulation RANS vs LES vs experimental data is denoted by “\_RANS”, “\_LES” or “\_Exp” respectively in the filename.
    - The performance data is broken up into individual files for each blade profile:
      * Positive camber “NACA2418”
      * Symmetrical camber “NACA0018”
      * Negative camber “NACA-2418”
    - These are further broken into phase averaged (\_PhaseAvg) and time averaged (\_TimeAvg) performance file
  + Variables
    - Phase averaged data files
      * **theta:** angular position in [deg]. Defines the coordinate system such that 0 occurs the blade angular velocity vector is pointing directly upstream, and 180 when traveling in the streamwise direction.
      * **Cp**: [nondimentional] Power coefficient as a function of position (theta), support and inertial effects subtracted off
      * **CForce**: [nondimentional] Force coefficient as a function of position (theta) support losses present
      * **CThrust**: [nondimentional] Thrust force coefficient as a function of position (theta) support losses present
      * **CLat**: [nondimentional] Lateral force coefficient as a function of position (theta) support losses present
      * **TSR**: [nondimentional] time averaged tip-speed ratio for reference to condition
    - Time-averaged data files
      * **Cp\_TA**: [nondimentional] time average power coefficient, support losses removed
      * **CForce\_TA:** [nondimentional] time average in plane force coefficient, support losses present
      * **CThrust\_TA:** [nondimentional] time average lateral force coefficient, support losses present
      * **CLat\_TA:** [nondimentional] time average in plane lateral forcecoefficient, support losses present
      * **TSR:** [nondimentional] time averaged tipspeed ratio
* Flowfields:
  + See “flowfields\_readme” for variables, coordinate system, non-dimentionalization and structure