

# AeroDyn Overhaul Kick-Off Meeting

National Wind Technology Center (NWTC)  
National Renewable Energy Laboratory (NREL)

Wednesday – Thursday, February 13 – 14, 2008

## Agenda

### *February 13 — AeroDyn Theory and Structure*

9:00 Welcome / Introductions

- Introductions (All)
- Agenda and purpose of meeting (JJ/SB)

9:30 Overview of Existing Code

- What is It (PM)
- Inputs (PM)
- Outputs (PM)
- AeroDyn Flowchart (PM)
- Wake Modeling – Blade / Element Momentum (BEM) (PM)
- Wake Modeling – Generalized Dynamic Wake (GDW) (PM)
- BEM Correction Models – Hub loss, Tip loss, Skewed flow (PM)
- Dynamic Stall (PM)
- Rotational Augmentation (PM)
- Tower Shadow (PM)

10:15 Overview of Existing Problems and Proposed Enhancements

- Reasons for Overhaul (JJ)
- Existing Problems (JJ)
- Proposed Modifications (JJ)

10:30 Break

10:45 Detailed Description of Problems, Proposed Enhancements, and Discussion

- AeroDyn Coordinate Systems (JJ)
- Binary Wind Files (BJ/NK)
- AeroDyn Wind Outputs (BJ/NK)
- Rotational Augmentation (PM)
- Interpolation of airfoil Data (MB)
- BEM Solution Iteration (MB)
- Influence of Drag on Induction (MB)

- Hub and Tip Loss Models (PM)
- Coned Rotor Corrections (PM)

12:30 Lunch

13:30 Detailed Description of Problems, Proposed Enhancements, and Discussion (continued)

- Initialization of GDW (MB)
- GDW Flow States (PM)
- GDW Stability – Turbulent Wake State (PM)
- GDW Stability – Inflow Velocity (PM)
- Dynamic Stall Models (Galbraith/et al, CENER, ONERA) (RG/XM/GB)
- Gaussian Quadrature (GB)
- Time Integration Issues (GB)
- Aerodynamic Model Interaction (PM)

15:00 Break

15:15 Detailed Description of Problems, Proposed Enhancements, and Discussion (continued)

- Impact of Turbine Motions and Turbulence on Wake (JJ)
- Rotor Motion Effects (PM)
- Direction Shear and its Influence on Induction (AS)
- Non-Rotor Aerodynamic Loads (MB/PM)
- Wake Tracking (PM)
- Tail Fin Aerodynamics (JJ)
- Apparent Aerodynamic Mass Effects (GB)
- Considerations for Water Turbines (JJ)
- Linearization of Wake and Dynamic Stall Models (JJ/GB)

17:00 Adjourn

18:30 Dinner at the Red Lion Inn [38472 Boulder Canyon Drive]

- Going “Dutch”
- Reservations made for 25 – 30 people with the open menu and open bar option
- East Room of the Main Dining Room requested

### ***February 14 — Interfacing of AeroDyn with Structural-Dynamic Codes***

9:00 Summary of Structural-Dynamic Codes that Interface with AeroDyn

- Coupled Aero-Hydro-Servo-Elastics
- YawDyn (MB)
- SymDyn (GB/JJ)
- FAST (JJ)
- MSC.ADAMS (JJ)
- MBDyn (JJ)

- SIMPACK (SH)
- 10:00 Overview of Existing Interface
- Overview of Existing Interface (JJ)
- 10:15 Overview of Existing Problems and Proposed Enhancements
- Reasons for Overhaul (JJ)
  - Existing Problems (JJ)
  - Proposed Modifications (JJ)
- 10:30 Break
- 10:45 Detailed Description of Problems, Proposed Enhancements, and Discussion
- Co-Simulation (AE)
  - Coupling Aerodynamic and Structural Modules – Issues (GB)
  - Modularization of AeroDyn (JJ/MB)
  - Requirements for the Introduction of Advanced Wake Theories (SG)
  - Development of a “Standardized” Interface (JJ/MB/SB)
- 12:30 Lunch
- 13:30 Detailed Description of Problems, Proposed Enhancements, and Discussion (continued)
- Passing Data Back and Forth (JJ)
  - Static or Dynamic Library (JJ)
  - NWTC Subroutine Library (MB)
  - Stand-alone Aeroacoustic Module (PM)
  - Input-File Format (MB)
  - AeroDyn Output Files (MB)
  - Other? (All)
- 15:00 Break
- 15:15 Review and Wrap-Up
- Plan Forward (JJ)
  - Review of Proposed Changes (JJ)
  - Discussion Forum (MB)
- 17:00 Adjourn