National Renewable Energy Laboratory

September 7, 2000 (Participant list updated October 9,2000)

Dear Wind Turbine Aerodynamics Enthusiast,

You are cordially invited to participate in our blind comparison. We would like everyone to use their favorite wind-turbine modeling tool to "predict" how the NREL Unsteady Aerodynamics turbine behaved in the NASA Ames wind tunnel. Everything is ready – all of the information you should need to build your model is now on our website: http://wind2.nrel.gov/amestest.

Thanks for the great response! To date, there are about a dozen participants in the blind comparison (see table below). If you haven't yet decided, you are still welcome to become involved. If you know any other potential participants not on the Science Panel member list (see website), please let me know.

Based on your input, we have identified 20 cases from the NASA Ames wind-tunnel test for the blind comparison. There are 14 upwind and 6 downwind cases that we would like each participant to run. The main differences between cases are turbine yaw position and wind speed. More specific information and instructions can be found on our website under the "Blind Comparison Overview" section. Please try to run as many of these cases as you can.

No one has seen the wind tunnel data (except a couple of us at NREL, but we are sworn to secrecy). We have purposely not yet disseminated any wind tunnel data, and will not do so until the blind comparison is done. We hope to convene the 2nd Science Panel meeting in early December 2000 (more information on schedule is below). We plan to present the results of the blind comparison to the Science Panel members at that time.

The main reason for the blind comparison is to make an initial attempt to try to identify areas where our wind-turbine modeling codes are deficient. The data from your code predictions will be compared to our measured data. We have identified a very specific set of output data for comparison. Please run your code to output these exact results if possible. We are asking that everyone insert their output results into a copy of an Excel file we have created specifically for this purpose. Please get yourself a copy of the Excel file from our website (it is a Microsoft Excel Office '97 version format file, we hope everyone can access it). PLEASE PROVIDE ONLY THE REQUESTED RESULTING OUTPUT DATA. PLEASE PUT YOUR OUTPUT DATA DIRECTLY INTO THE SHADED AREAS ON THE EXCEL SPREADSHEETS. OTHER THAN INSERTING YOUR DATA, PLEASE DO NOT FURTHER MODIFY THE FILE. The Excel file contains a total of 20 spreadsheets, one for each case. This will make it much easier for us to assimilate all of your data and produce plots and tables that compare your results to the wind tunnel test data. Please e-mail or ftp the Excel file to the locations specified in the instructions when you are finished inserting your data.

We hope that everyone can run the requested cases and send us their Excel file no later than November 3rd, 2000. After that, we will assemble all of the results and prepare for presentation at the 2nd Science Panel meeting. Our current thinking is that we will try to schedule the 2nd Science Panel meeting in conjunction with the IEA Aerodynamics Experts meeting. This year's IEA Aerodynamics Experts meeting will be hosted by NREL on December 4th and 5th. We're thinking that the 2nd Science Panel

meeting would start the afternoon of December 5th and continue through the 6th. (The IEA Annex XVIII meeting will follow on December 7th and 8th).

After the blind comparison, the next step will be a "calibrated" comparison. For this, we will ask the participants to refine some of their models (a minimal subset of the blind comparison test cases) based on the wind tunnel data, and document the changes needed to achieve best results. Documentation of required code refinements and model input changes will likely be the most important outcome of these comparisons, and details will be further discussed at the 2nd Science Panel meeting. All results of both the blind and calibrated comparisons will then be published. We anticipate that these results will help us better focus future work in wind turbine aerodynamics.

The 20 cases selected for the blind comparison are a small subset of the 1700 wind tunnel test cases available. After the blind comparison is completed, we plan to provide access to the additional data for the purpose of further pursuing specific research questions and topics. Subsequent access to the additional data will be limited. Priority will be given to comparison participants. Those wishing access to the additional data sets will be required to submit a proposal to NREL describing data needs, anticipated potential benefit, and results to be delivered in exchange for data provided.

Regards,

Dave Simms (303) 384-6942, dave_simms@nrel.gov
Lee Fingersh (303) 384-6929, lee_fingersh@nrel.gov
Maureen Hand (303) 384-6933, maureen_hand@nrel.gov
Scott Schreck (303) 384-7102, scott_schreck@nrel.gov

NREL/NASA Ames Science Panel - Blind Comparison Participants as of Oct 9, 2000

Participants	Organizations	Codes	Code Types
Craig Hansen, Dave Laino	Windward Engineering	ADAMS YawDyn	Multi-body aeroelastic model using "AeroDyn" aerodynamics (BEM/ Leishman-Beddoes) Aeroelastic model with rigid blade flapping hinge blade or teeter plus yaw degree of freedom using "AeroDyn"
Phillipe Giguere/ Jim Tangler	Enron/ NREL	PROPID-C	Performance model with BEM and Corrigan stall delay model
Bob Wilson	Oregon State University	FAST_AD	Assumed modes aeroelastic model using "AeroDyn" aerodynamics (BEM/ Leishman-Beddoes)
Michael Selig	University of Illinois	PROPID-C PROPID-UI	Performance model with BEM and Corrigan stall delay Performance model with BEM and UI stall delay model
Wayne Johnson	NASA Ames	Camrad II	Aero-mechanical rotorcraft analysis tool
Lakshmi Sankar	Georgia Tech	Hybrid CFD	3D multi-domain unsteady Navier-Stokes model
Helge Madsen	Riso	HawC HawC-3D	Aeroelastic model HawC with BEM theory Aeroelastic model HawC with 3D CFD actuator disc model
Niels Sorensen	Riso	EllipSys3D	3D incompressible Navier-Stokes solver
Herman Snel	ECN	Phatas	Aeroelastic model
Robert Rawlinson - Smith	Garrad-Hassan	*BLADED*	Assumed modes aeroelastic model with BEM/ Beddoes-Leishman aerodynamics
Frank Coton	University of Glasgow	HawtDawg	Prescribed wake model (Horizontal Axis Wind Turbine Directly Allocated Wake Geometry)
Bjorn Montgomery/ Anders Bjorck/ Hans Ganander	FFA/ Nordic Windpower/ Teknikgruppen	VIDYN	Aeroelastic code with "AerForce" aerodynamics and "DynStall" dynamic stall (BEM/ Leishman-Beddoes)
David Malcolm, Tim McCoy, Dayton Griffin	Global Energy Concepts	ADAMS	Multi-body aeroelastic model using "AeroDyn" aerodynamics (BEM/ Leishman-Beddoes)
Martin Hansen/ Takis Chaviaropoulos	Tech Univ of Denmark/ CRES Greece	ROTABEM	Performance model with BEM using 3-D corrected airfoil data based on a quasi-3D Navier-Stokes solver
James Shawler	Loughborough University CREST UK	ADAMS	Multi-body aeroelastic model using "AeroDyn" aerodynamics (BEM/ Leishman-Beddoes)