The Airflow Update®

AIRFLOW SCIENCES CORPORATION

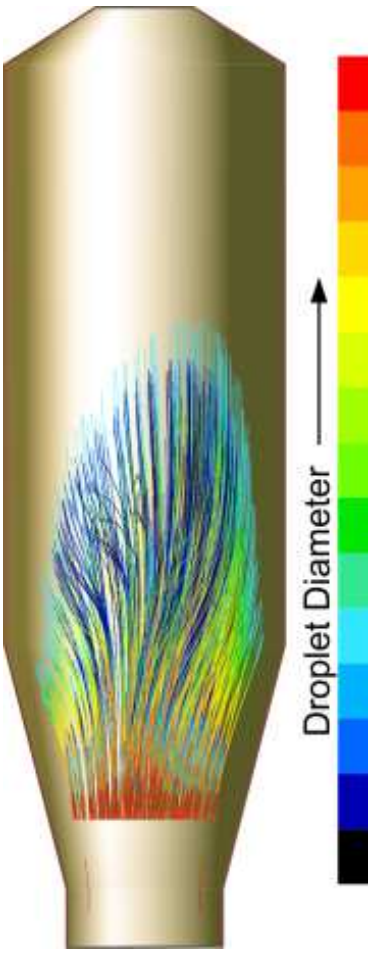
Fall 2005

Optimizing the Flow of Scrubbers

In order to remove SO_2 and fine particulate, many power plants install a wet or dry scrubber. Scrubbers are very complicated from a flow modeling standpoint, and it can sometimes be difficult to sort out just what model is right for your application. Whether a CFD or scaled physical model will be used, there are a host of decisions to be made.

Three basic scopes exist for flow models of wet or dry scrubbers:

- **Inlet duct model only**. This type of model can be used to ensure that the gas flow into the unit is not stratified, and to minimize the dP and ash accumulation in the ductwork. Particularly in the case of wet scrubbers, inlet duct models can also be used to ensure that gas flow near the floor is sufficient to prevent slurry back-up into the inlet duct, since slurry can cause corrosion of the ductwork.
- **Model of gas-only flow through the scrubber.** Using this model, the resistance resulting from the spray is sometimes modeled as a perforated plate or a distributed resistance. This can often be used to ensure reasonable bulk behavior, such as overall flow uniformity, but cannot be used to predict mixing between the untreated gas and other injected gases or evaporating liquids.
- **Model including spray injection and evaporation.** For most scrubbers, quench liquid injection will have significant effects on the flow field. The bulk effect can be simulated using a distributed resistance, but the detailed local effects of the injection and subsequent gas cooling are often of interest. Evaporation of these droplets can be included if a CFD model is employed. Since the actual quench liquid injection is modeled, all effects including temperature change, gas momentum, and turbulence levels are naturally included.



Detailed models of parts of a scrubber, such as a mist eliminator, can also help to deal with specific challenges.

ASC has the skills and experience to perform any physical or CFD model of your wet or dry scrubber. Download our presentation regarding flow modeling of scrubbers from our website.

EPRI Coal Flow Loop Update

ASC's **Rob Mudry P.E.** presented some of the revolutionary findings from the data obtained at the EPRI Coal Flow Measurement Facility, located at ASC. *"Pulverized Coal Extractive Testing Methods: Evaluation at the EPRI Coal Flow Loop"* was presented at the COAL-GEN 2005 conference. Data from testing with both the ISO 9931 and ASME method were compared and contrasted, as were the effects of testing in proximity to an elbow. For a copy of this paper, please visit our website or call ASC.

From the Editor

Our move down the road to our new offices went well. Be sure to update your Palm Pilot or Rolodex with our new address and phone number on the back of this newsletter.

*Expanding offices mean expanding staff. A whole hearted welcome aboard to **Mark Maurin**, **Jason Tolfree**, **John Zvonek**, and **Kevin Van Arsdale,** all who joined Airflow since our last Update. And speaking of newcomers, congratulations are in order for **Dr. Paul Harris** with the arrival of his baby daughter Elizabeth Marie.*

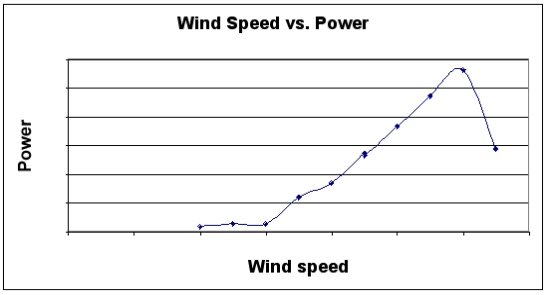
If you have any flow or heat related issues, please give Airflow Sciences a call.

Edited by Kevin Linfield, P.E.

ASC and Alternative Energy

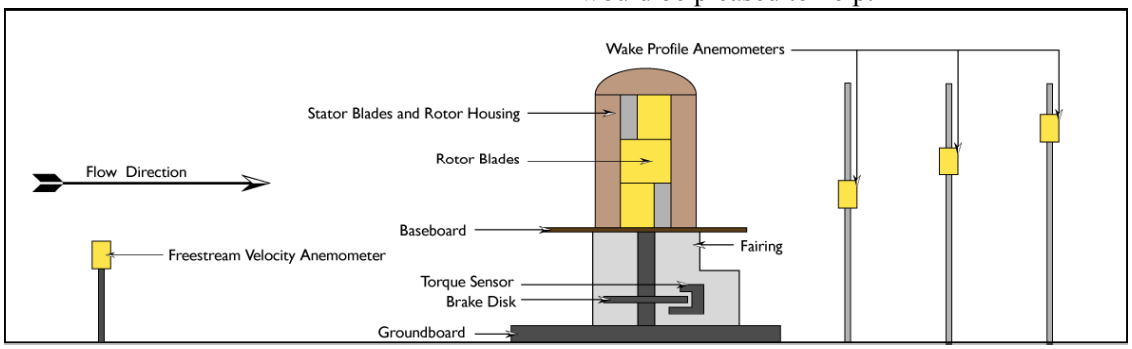
ASC has been heavily involved in the traditional electrical energy industry for several decades now, performing computer flow modeling, physical flow modeling, and field testing. Less well known is our involvement in the alternative energy scene. For several years now, ASC has been assisting in research toward laser fusion, which may someday be a source of plentiful, clean energy. More recently, ASC worked with a company devoted to harnessing the wind to generate electricity.

Tri-Source Energy is developing wind farms for regions that are remote from the traditional energy grid. In order to be effective, the systems need to be efficient, low cost, and scalable. Arrays of vertical axis wind turbines have been selected by Tri-Source for consideration, but a number of questions remained regarding the performance of the design and the layout of the array.



ASC tested a scale model of the wind turbine in the University of Michigan wind tunnel to determine the optimal rotational speed, the variation of power output with wind speed, and the effect of wind direction on performance. In addition, the aerodynamic loads were measured, which will be used in designing the turbine support structure. The extent of the turbine wake was also measured. This data will be used to set the spacing on the array of turbines.

If you have unique flow-related concerns, our staff of licensed professional engineers would be pleased to help.



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ASC Quote-of-the-Newsletter:

"When the day is bad and life's a curse cheer up! Tomorrow may be worse."
Chris Browne

Airflow Events

We hope to see you at future trade shows including:

- *Power-Gen* (Dec 6-8, Las Vegas, NV)
- NOx RoundTable & Expo (Jan 23-24, Charlotte NC)
- SNAXPO (March 19-22, Las Vegas, NV)
- Electric Power 2006 (May 2-4, Atlanta, GA)
- APC Roundtable & Expo (July 16-18, Columbus, OH)
- Coal Gen 2006 (Aug 16-18, Cincinnati OH)
- **Your Office:** Looking to host a seminar on modeling, fluid flows, or heat transfer?

We make house calls!

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