Course Overview and Objectives

The main objective for this short course on aerodynamic blade design is to "learn by doing." Accordingly, the focus will be on systematically using the computer program PROPID in a tradeoff study leading to a final blade geometry. Several blade design examples will be used to achieve this goal.

Background information on blade design methods, tradeoffs, and issues will be covered. Following the working session with PROPID, a few topics regarding airfoil data will be discussed to highlight its impact on the blade design process. Finally, different approaches to blade geometry optimization will be discussed, and an overview of the companion code PROPGA will be given. The details of PROPGA are not covered in these materials.

At the end of this short course, participants will be given the latest version of PROPID and should have a working knowledge of these topics:

- Balancing tradeoffs in blade design - aerodynamics, structures, cost, and noise

- Understanding key design criteria for wind turbine airfoils

- Making appropriate airfoil selections for a particular blade design

- Applying empirical post-stall models and understanding their limitations

- Using the inverse and direct design capabilities of PROPID

- Preparing airfoil data sets for PROPID, including the treatment of roughness effects

- Understanding the purpose of PROPGA in comparison with PROPID

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