

# SAFL SEMINAR SERIES

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ST. ANTHONY FALLS LABORATORY ~ AUDITORIUM

## Advanced Multivariable Control for Industrial Wind Turbines

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*Abstract:*

The use of wind power is rapidly increasing due to a demand for renewable energy resources. This growth has been achieved, in part, by moving to increasingly larger turbine designs. Unfortunately tower and blade flexibility become significant at larger dimensions resulting in higher structural loads. This leads to additional failures, longer downtimes, and increased maintenance costs. This talk will focus on advanced control methods to mitigate structural and drivetrain loads while increasing power capture. In particular, turbine performance can be improved using individual blade pitch control as well as the incorporation of new sensors, e.g. LIDARs for wind preview measurements. Advanced multivariable control design methodologies can deliver superior performance and reduced structural loads but they tend to have significantly more tunable design parameters. Hence tuning of these multivariable controllers can be more time consuming as well as requiring specific expertise in the particular design methodology. The increased design time and cost has slowed the transition of these methodologies to industrial turbines. A framework for efficient design of multivariable wind turbine controllers will be presented.