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TUESDAY, JULY 16
9:00 A.M. - PHSC 202

“How can Doppler lidars measure turbulence in the lowest part of the atmosphere?”

The spectral velocity tensor model of Mann (1994) was originally developed to estimate buffeting on suspension bridges, but its main use has been to describe the turbulent inflow to wind turbines in order to calculate the dynamic loads. The background and basic theory of the model will be presented together with various comparisons with atmospheric measurements and possible future improvements. Recently, the model has been used to describe the difference between turbulence measured with lidars and ordinary instruments, such as sonics anemometers, where the size of the sampling volume is much smaller than that of the lidar. Ideas on how to improve the lidars ability to measure turbulence will also be presented.

Related Reading:

Mann, J., 1994: The spatial structure of neutral atmospheric surface-layer turbulence, *J. Fluid Mech.*, **273**, 141-168.

Sathe, A., J. Mann, J. Gottschall, and M. S. Courtney, 2011: Can wind lidars measure turbulence?, *J. Atmos. Ocean. Technol.*, **28**, 853-868.

Sathe, A. and J. Mann, 2012: Measurement of turbulence spectra using scanning pulsed wind lidars, *J. Geophys. Res.*, **117**, D01201, doi:10.1029/2011JD016786.

Mann, J., A. Pena, F. Bingol, R. Wagner, and M. S. Courtney, 2010: Lidar scanning of momentum flux in and above the atmospheric surface layer, *J. Atmos. Ocean. Technol.*, **27**, 959-976.