Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Performance Analysis of Flexible-Bladed Vertical-Axis Wind Turbines LALIT ROY, DAVID MACPHEE, The University of Alabama — In this study, airfoil lift and drag coefficient data are used in a blade element momentum theory-based double multiple stream tube (DMST) model to assess performance of a chord-wise flexible vertical-axis wind turbine (VAWT). Wind-tunnel experiments are performed for rigid and flexible airfoils, over a range of Reynolds numbers, and performance improvements in terms of lift and drag coefficients are discussed. Airfoil simulations are performed using the OpenFOAM framework to help identify any mechanisms of airfoil performance improvement. Finally, airfoil lift and drag data are used with the aforementioned DMST model to investigate any performance improvements in VAWT performance through the use of flexible blades.

David MacPhee
The University of Alabama

Date submitted: 31 Jul 2019 Electronic form version 1.4