

Abstract Submitted  
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**Aerodynamic Interactions between Pairs of Vertical-Axis Wind Turbines** IAN BROWNSTEIN, JOHN DABIRI, Stanford University — Increased power production has been observed in downstream vertical-axis wind turbines (VAWTs) when positioned offset from the wake of upstream turbines. This effect was found to exist in both laboratory and field environments with pairs of co- and counter-rotating turbines. It is hypothesized that the observed power production enhancement is due to flow acceleration adjacent to the upstream turbine caused by bluff body blockage, which increases the incident freestream velocity on appropriately positioned downstream turbines. This type of flow acceleration has been observed in computational and laboratory studies of VAWTs and will be further investigated here using 3D-PTV measurements around pairs of laboratory-scale VAWTs. These measurements will be used to understand the mechanisms behind the performance enhancement effect and seek to determine optimal separation distances and angles between turbines based on turbine design parameters. These results will lead to recommendations for optimizing the power production of VAWT wind farms which utilize this effect.

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